

# LA REVUE AGRICOLE

DE

## L'ILE MAURICE

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## LES DÉGÂTS CAUSÉS PAR LE CYCLONE DU 16 JANVIER

Les lecteurs de la Revue Agricole liront avec intérêt l'étude de M. M. Herchenroder, Assistant Directeur de l'Observatoire, sur le cyclone de janvier dernier.

Pour l'île Maurice, le souvenir de l'année 1945 sera toujours associé à ce cyclone qui a causé des ravages dont il n'est pas possible d'estimer encore toute l'ampleur.

Nous nous attacherons à faire ici un bref exposé des conséquences du cyclone au point de vue agricole en excluant les dommages causés aux usines, camps et habitations. Nous espérons pouvoir publier dans la prochaine livraison de la Revue Agricole une série de photographies illustrant les dégâts subis par les propriétés sucrières.

### *Canne à Sucre*

Il est extrêmement difficile, voire même impossible, d'estimer avec une certaine précision, au début de la période de croissance, comme dans le cas qui nous occupe ici, les réductions de rendement et d'extraction que subira la prochaine coupe. Le cyclone ayant traversé l'île du Nord au Sud il en ressort que les cannes ont été très abîmées dans toutes les régions. Les localités où les vierges sont plantées de décembre à mars pour être coupées 18 mois plus tard auront évidemment souffert davantage car, outre le feuillage déchiré, beaucoup de "têtes" ont été brisées. De plus, ces régions se trouvent précisément dans une zone climatique où la croissance de la canne est considérablement ralentie à partir du mois de mai. On dépend encore dans ces régions des rendements des vierges pour élever la moyenne générale des rendements.

Quoiqu'il en soit, il semblerait déraisonnable de compter sur une coupe de plus de 200,000 tonnes pour 1945, même si la répartition des facteurs humidité et chaleur sont favorables au développement et à la maturation de la canne jusqu'à la coupe prochaine.

### *B. Cultures Vivrières.*

(1) *Maïs.* Le maïs a relativement peu souffert du cyclone. La majorité des plantations avaient été faites, en effet, à partir de la mi-décembre, peu seulement, après la venue des grandes pluies. Elles étaient conséquemment au début de leur croissance. Le lavage et l'entraînement des terres cependant ont été assez graves dans certains endroits, particulièrement dans

les champs bien entretenus, et une forte proportion de repiquage est à prévoir. De même, il y aura un retard inévitable dans la croissance en raison des fenilles brûlées et lacérées par le vent. Les plantations de maïs exécutées d'après les programmes officiels du Gouvernement par les propriétés de plus de 200 arpents se décomposaient comme suit lors du passage du cyclone :

Superficie plantée en :		Arpents
Juillet	1944	2484
Août	"	1066
Septembre	"	1148
Octobre	"	729
Novembre	"	200
Décembre	"	2813

De ces plantations la récolte avait commencé sur celles effectuées en juillet, et les pertes ne seront pas élevées. Le maïs planté d'août à novembre avait déjà beaucoup souffert de la saison sèche, il ne reste donc plus que les plantations de décembre qui, comme il a été expliqué plus haut, ont souffert davantage de l'entraînement du sol que de la vitesse des vents.

(2) *Manioc*. Les plantations de manioc qui avaient déjà souffert du cyclone d'avril 1944, et qui s'étaient refaites depuis ont été détruites à nouveau par le cyclone. Environ 3000 arpents de manioc ont été rendus inutilisables de la sorte.

(3) *Patate, Arouille, Pistache, Riz*. Le cyclone n'a causé que peu de dommages à ces plantations. Dans beaucoup de cas le feuillage des patates n'a même pas été brûlé. Il semblerait également que les champs de arouilles, de pistaches et de riz n'ont pas été très abîmés, bien que l'entraînement du sol ait été assez considérable dans certaines localités.

(4) *Légumes*. La disette de légumes s'est fait sentir presque immédiatement après le cyclone, et ce n'est guère avant le mois d'avril qu'on pourra espérer en avoir en abondance. Il est intéressant de remarquer que chez certains légumes filants tels les giraumons et chou-chou, la végétation a repris très vite après le cyclone ; dès le 28 janvier nous avons observé des plants de giraumons en pleine floraison. Par contre les plantations de haricots, vohèmes, patissons, bringelle et autres légumes d'été ont été complètement détruites.

### C. Aloës

L'industrie de l'aloës a subi des dommages importants. Beaucoup de filatures ont eu leurs toitures enlevées, des fibres emmagasinées ont été trempées, et des fibres en cours de préparation ont été complètement perdues.



C'est cependant les plantations qui ont le plus souffert de la violence du vent. La majorité des feuilles prêtes à être récoltées ont été "peignées" et brûlées, la fermentation s'est mise dans les feuilles meurtries, abîmant aussi les fibres. Il est à craindre qu'un effet indirect du cyclone sera l'envahissement encore plus intense des régions sous alcôes par l'herbe condé. Cette plante ayant moins souffert des effets du cyclone sera en mesure de lutter avec plus d'acharnement et gagner ainsi du terrain. Signalons en passant l'influence nuisible de l'herbe condé sur la qualité des fibres d'alcôes ; les tiges de cette plante qui se trouvent en contact avec les feuilles d'alcôes abîment les tissus par friction, surtout pendant les fortes brises, des lésions où se mettent la fermentation sont ainsi formées au détriment de la qualité des fibres.

### D. Thé

Quoique le thé soit une plante qui résiste généralement bien aux fortes brises, des dégâts appréciables sont causés aussitôt que le vent dépasse une certaine vitesse. Les touffes de thé sont pour ainsi dire "indéracinables". Le dernier cyclone n'en a pas arraché une seule. Par contre les jeunes tiges ont été dépouillées de leurs feuilles, et les feuilles qui ont résisté au vent ont été plus ou moins brûlées. Ceci équivaut à dire qu'il y aura un retard considérable avant la reconstitution de nouvelles tiges, retard que l'on peut estimer environ à quatre semaines.

### E. Arbres Fruitiers, Arbres de Forêts, Végétation Spontanée.

Les arbres ont payé un lourd tribut à l'ouragan. Beaucoup de "vieux amis" qui formaient partie intégrante du paysage ont été mutilés ou déracinés.

Les letchis, longaniers, manguiers, jacquiers, fruits à pain, avocats et autres arbres fruitiers ont été brûlés par le vent, sans compter le nombre considérable d'entre eux qui ont été abattus. Il est à prévoir que la récolte fruitière du pays sera affectée d'une manière sensible pendant plus d'un an, car beaucoup de tigelles sur lesquelles se développent les bourgeons floraux ont été brisées. Il serait intéressant de connaître le volume de bois tombé pendant le cyclone. Parmi les arbres ayant résisté le moins au vent, le long des routes, l'on doit remarquer particulièrement les *Terminalia arjuna* qui formaient des voûtes magnifiques de verdure le long de certaines routes notamment dans les districts de Flacq et de la Savane.

Les plantations de filaos sur le littoral, d'eucalyptus, de conifères sur les hauts plateaux ont éprouvé des dégâts considérables, particulièrement là où les arbres étaient plus espacés.

D'une façon générale, les arbres, arbustes et buissons cultivés ou croissant spontanément ont eu leurs frondaisons complètement détruites et

toute la campagne mauricienne du Cap Malheureux à la Baie du Cap, de Tamarin à Mahébourg offrait après le cyclone un sinistre aspect de désolation. Parmi les plantes croissant spontanément, c'est l'herbe condé croyons-nous qui recommença à bourgeonner le plus tôt, dès le 23 janvier des bourgeons apparaissaient sur cette plante dans les localités chaudes.

Le cyclone a eu des répercussions inévitables sur l'approvisionnement en fourrage des vaches laitières particulièrement.

Il est intéressant de constater ici que les plantes indigènes de Maurice résistèrent admirablement bien au cyclone. Très peu d'arbres furent déracinés ou eurent des branches cassées, le feuillage ne portait aucune trace de la violence des vents, et c'est ainsi qu'au cours d'observations faites dans les forêts du plateau des gorges de la Rivière Noire le 27 janvier, on se demandait vraiment si un cyclone avait passé sur notre île. Rappelons que les arbres indigènes ont des adaptations très nettes pour résister au vent. Ces adaptations peuvent se résumer ainsi : croissance très lente (certains arbres n'augmentent que de quelques millimètres de diamètre par an), tronc relativement court armé de contreforts, racines s'étendant le long du sol, souvent au delà de 15 mètres du tronc, attache très solide des feuilles aux tiges, couronne de peu d'étendue, feuilles coriaces et revêtues d'un épiderme épais et résistant, marges des feuilles protégées par des cellules lignifiées.

Le cyclone a causé des dommages irréparables au jardin des Pamplemousses. Un relevé établi par la division agricole du Département d'Agriculture indique qu'environ 150 gros arbres ont été déracinés et 225 autres gravement endommagés. Parmi ces arbres plusieurs espèces étaient des spécimens uniques. De plus les belles avenues de palmier qui donnaient un cachet particulier à notre jardin national ont été mutilées, les gros arbres en tombant ont écrasé les arbustes des alentours, la grille principale s'est effondrée sur un parcours d'environ 200 pieds ; comme ailleurs les oiseaux ont presque complètement disparu. Il est à craindre qu'il faudra bien des années pour que le Jardin reprenne à nouveau toute sa beauté.



NOTES SUR LE CYCLONE DU 1<sup>ER</sup>. FÉVRIER

Alors que l'article précédent sur les dégâts causés par le cyclone de janvier était sous presse, un autre cyclone venant de l'est passait sur le sud de l'île tôt dans la matinée du 2 février. Les données météorologiques sur ce météore seront publiées dans la livraison Mars-Avril de la Revue Agricole. D'après des renseignements dignes de foi il semblerait que la trajectoire du cyclone ait été du même genre que celle du cyclone de mars 1931. C'est unique dans les annales du pays, croyons-nous, que le centre de deux cyclones ait passé sur l'île la même année, *a fortiori* à 15 jours d'intervalle et avec des vents atteignant 90 milles à l'heure et au-dessus dans les deux cas. Ces deux cyclones sont sans doute les plus violents que l'on ait ressentis depuis 1892. Nous relevons à la page 70 de l'ouvrage de Walter "The Sugar Industry of Mauritius", qu'en 1863 il y eut deux violents ouragans, les vents ayant atteint 80 milles à l'heure : le premier passant sur la région S.O. de l'île le 13 janvier, le second passant à 50 milles au N.O. le 20 février.

Le cyclone de février est venu aggraver une situation déjà très difficile. Des dommages considérables ont été causés aux immeubles et bâtiments, qui étaient en cours de réparations ou demandaient à être réparés après le premier cyclone. Ce sont principalement les régions du sud qui ont le plus souffert. La majeure partie des usines dans les districts du Grand Port et de la Savane ont subi des dégâts assez importants. Les feuilles de cannes émises depuis le 16 janvier ont été lacérées à nouveau. Les conséquences de ce cyclone au point de vue de la prochaine coupe sont graves. Un nouveau retard d'une quinzaine de jours a été apportée à la croissance, et bien que dans le nord de l'île les cannes aient relativement moins souffert, il est à craindre que la production de sucre du pays soit la plus faible enregistrée depuis 1931 ; à condition que les facteurs climatiques ne soient pas défavorables.

## LE CYCLONE DE JANVIER 1945.

M. HERCHENRODER, B. Sc.

Assistant Directeur de l'Observatoire

Bien que le cyclone de 1892 fasse encore figure de cataclysme légendaire dans les annales de ce pays, il semblait néanmoins, avant les événements de la deuxième quinzaine de ce mois, que la crainte des cyclones, encore vive chez les vieux habitants de l'île, s'était de beaucoup atténuée dans l'esprit de la présente génération. En effet, le plus récent cyclone ayant laissé un souvenir désagréable chez nous — le cyclone de mars 1931, — remonte à près de 15 ans en arrière, et celui-là d'ailleurs ne fut pas très méchant, ayant surtout fait beaucoup de mal aux plantations. Cependant, ceux que leur profession amenaient à faire chaque année le bilan de ces météores qui sillonnent l'Océan, ne pouvaient s'empêcher de remarquer au cours de ces dernières années une fréquence accrue des cyclones ayant un caractère plutôt violent.

Parlons seulement pour mémoire de ce cyclone de février 1927 qui s'abattit avec une violence inouïe sur Tamatave — le baromètre, dit-on, descendit alors à 705 mms. Puis, en février 1932, un cyclone de rare violence passa sur notre voisine, la Réunion ; à son point le plus bas, le baromètre enregistra 714.8 mms ; près de cent personnes perdirent la vie et les dégâts furent considérables.

Plus récemment, il y eut en février 1941, un cyclone dont le centre s'abattit en plein sur Rodrigues ; au plus fort de la tempête, l'anémomètre enregistra 105 milles/heure de vitesse de vent en rafales, avec 80 milles/heure de vitesse soutenue ; pendant près de cinq heures successives, les rafales soufflèrent à plus de 90 milles/heure.

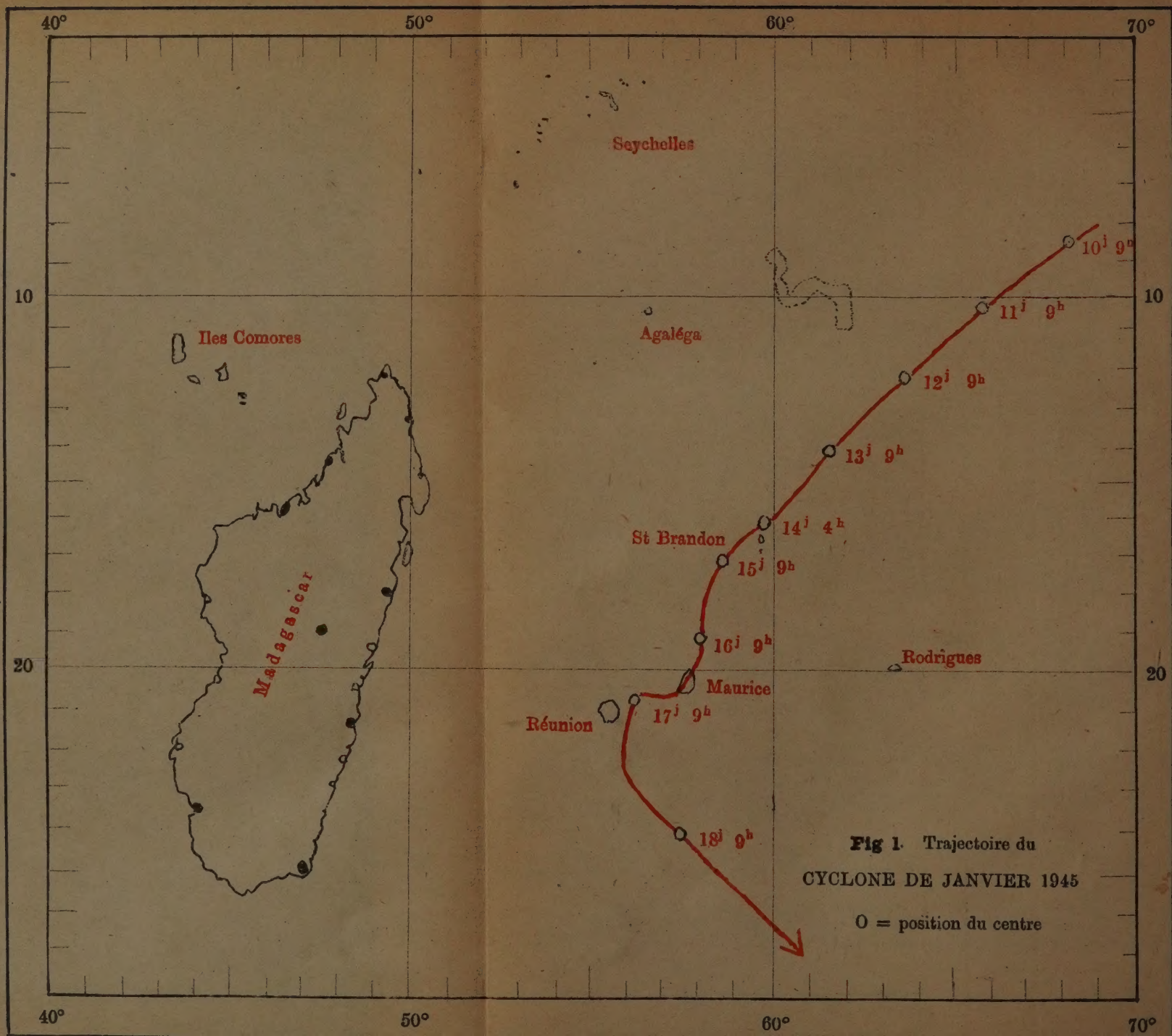
En février 1943, un autre cyclone violent aborda Tamatave ; le baromètre descendit à 720 mms ; de graves dommages furent occasionnés au port et à la ville. Rappelons, enfin, le cyclone d'avril de l'an dernier qui ravagea l'île-sœur, et dont le minimum barométrique fut de 716.5 mms. Le vent, dit-on, souffla à 93 milles/heure.

Nous avons donc eu beaucoup de chance ! Mais, selon les règles du hasard, notre tour viendrait un jour ou l'autre.

Dix jours de la nouvelle année s'étaient à peine écoulés, que les cartes météorologiques faisaient constater un centre dépressionnaire se creusant très loin au Nord-Est de Maurice, vers le 8<sup>ème</sup> parallèle Sud.









Trois jours après, les premières alertes étaient données dans les bulletins. Un cyclone bien campé se dirigeait sur St. Brandon, situé, comme on le sait, à 250 milles environ au Nord-Est de notre île (fig. 1). Le cyclone aborda St. Brandon le 14 Janvier, au lever du jour. Auparavant, le météore avait franchi plus de 600 milles d'Océan à une vitesse moyenne de 7 milles à l'heure environ ; mais arrivé au voisinage de St. Brandon, le centre ralentit. Passant assez près au Nord, puis au Nord-Ouest de l'île, la trajectoire s'incurva graduellement vers le Sud-Ouest, puis le Sud, faisant dévier la marche du cyclone en direction de Maurice. Si ce changement de direction dans la marche se prolongeait vers le Sud-Sud-Est ou vers le Sud-Est, le centre nous éviterait. C'est avec cette possibilité de voir l'île être épargnée que les météorologistes comptèrent ce matin du 16 janvier. De plus, le cyclone dès son arrivée à St. Brandon, avait très sensiblement ralenti sa marche, ce qui est un indice habituel d'une incurvation de la trajectoire. Cependant, avec la fuite des heures, on ne pouvait que voir s'aggraver la menace. Dans l'après-midi du 16 janvier le centre était très proche de la côte Nord-Nord Est de l'île. Passerait-il le long de la côte à l'Est ? — C'était encore possible. Mais le vent à l'Observatoire des Pamplemousses avait atteint à ce moment 45 à 50 milles/heure de moyenne avec rafales de 70 à 75 milles/heure et avait tourné en direction de Sud-Est  $\frac{1}{2}$  Est — (direction enregistrée aux premières heures du 16) à Est  $\frac{1}{2}$  Sud à partir de 4 heures de l'après-midi ce même jour.

Ainsi le pire de l'ouragan nous était destiné. Avec l'arrivée de la nuit, le centre fonçait sur l'île, qu'il traversa à une vitesse accrue de 10 $\frac{1}{2}$  milles/heure environ (fig. 2). Le calme central même du cyclone passa très près à l'Ouest de l'Observatoire des Pamplemousses vers minuit. A Vacoas, le calme absolu du centre fut enregistré vers 1 heure 20 minutes du matin le 17 ; vingt minutes plus tard, l'anémomètre de Plaisance enregistrait le milieu d'un calme partiel.

Arrivé au voisinage de la côte Sud de l'île, le cyclone prit une direction Ouest par Sud et se dirigea vers l'île de Réunion. Ce fut le 17 à 9 heures du matin, seulement quelques heures après avoir traversé Maurice, que le centre s'approcha au plus près de notre voisine. — Le minimum barométrique observé à St. Denis laisse comprendre que le centre traversa à 40 ou 50 milles environ de la Réunion\*, en recourbant sa marche une fois de plus vers le Sud et enfin vers le Sud-Est, ce qui l'éloigna alors assez rapidement.

Certaines lectures extrêmes des instruments au cours de ce cyclone ont déjà été publiées ; elles sont reproduites et complétées dans le tableau suivant :

\* Il s'agit du cyclone principal ; il semblerait d'après les données de vent à St. Denis qu'un petit tourbillon secondaire, détaché du cyclone ait abordé le Nord de la Réunion dans la matinée du 17 janvier.

Poste d'observation	Minimum barométrique		Maxi- mum de vent sou- tenu	Maxi- mum des rafales	Minimum de vent au passage du centre
	mbs.	mms.	m/h	m/h	m/h
Observatoire Royal Alfred ...	952.6	714.5	66	90	5—10
Station météorologique de Vacoas ...	952.1	714.2	66	98	calme plat.
Station de Plaisance ...	953.9	715.5	65	97	25—30
St. Denis — la Réunion.	984.0	738.0	58	?	—
St. Brandon ...	980.0	735.1	—	> 75	—

Sur la structure même du vortex cyclonique, les détails qui suivent intéresseront peut-être le lecteur.

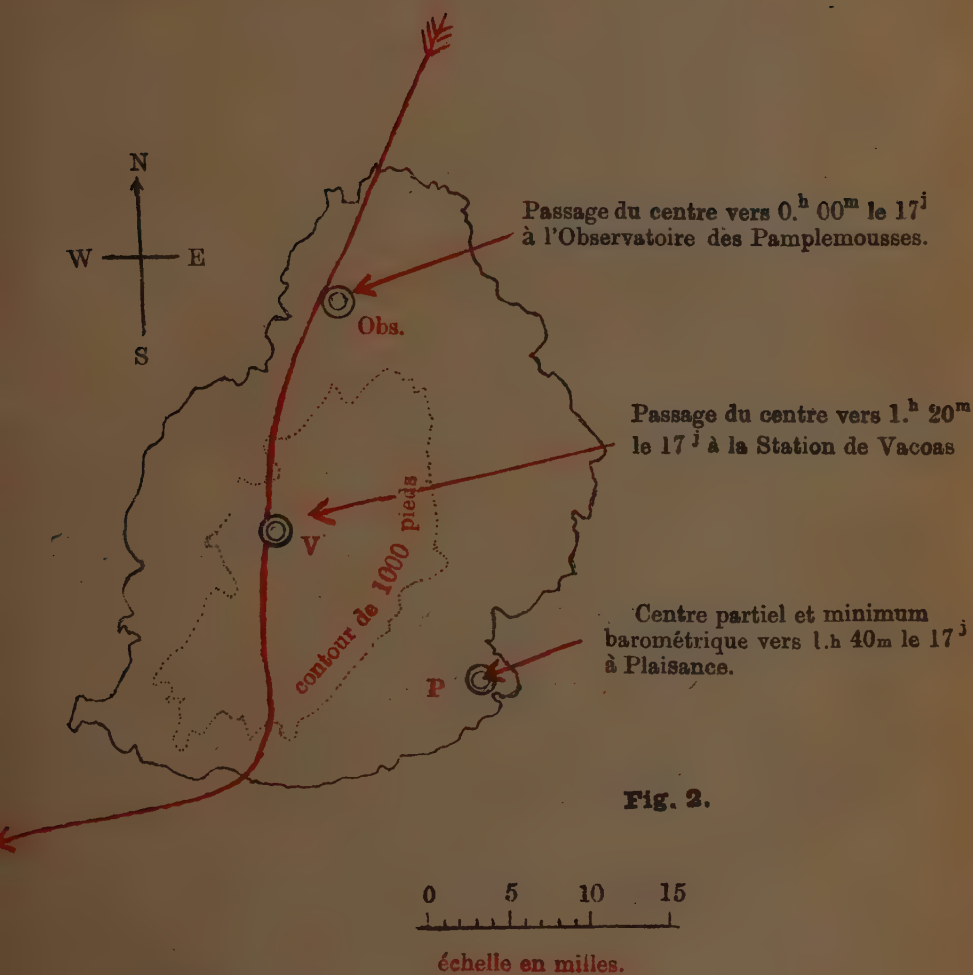
A partir du point où la circulation centrale du cyclone commençait à diminuer jusqu'au calme plat du centre, on calcule un diamètre de 25 à 30 milles; mais le calme absolu, ou "the eye of the storm" selon l'expression américaine, ne s'étendait que sur un diamètre de 7 à 8 milles seulement.

La profondeur du centre, à son passage sur Maurice, fut de 60 millibars environ; il est rappelé à des fins de comparaison que le cyclone de 1892 avait une profondeur de 70 millibars, tandis que celui de 1931 n'avait qu'une profondeur de 41 millibars.

La plus forte chute horaire de pression, observée à Vacoas à l'avant du centre, fut de 8.5 millibars; tandis que la hausse horaire à l'arrière du centre fut de 7.9 millibars. On calcule par ailleurs que le gradient de pression sur le pourtour du centre fut de 0.75 à 0.78 millibar par mille; ce gradient de pression correspondait dans le cas présent à une vitesse moyenne de vent de 65 milles/heure.

En général le rapport entre la vitesse des rafales et la vitesse moyenne ou vitesse "soutenue" de vent, diminue un peu au fur et à mesure que l'on s'approche du centre et que la vitesse augmente. A Pamplemousses, en rase campagne, l'anémomètre de l'Observatoire laissa constater un rapport de 1.5 pour un vent moyen de 30 milles/heure, mais ce rapport diminuait





**Fig. 2.**

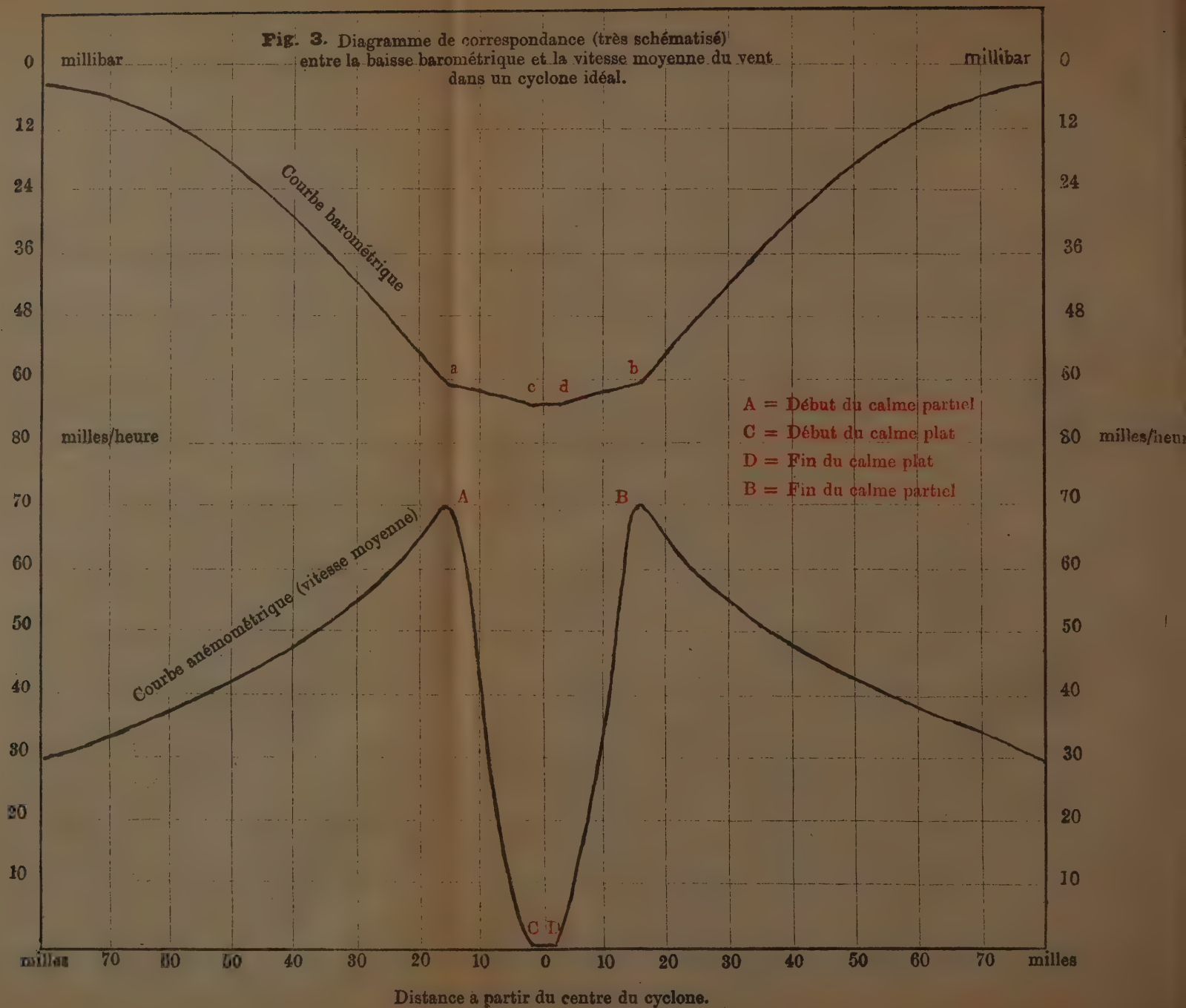
**Fig. 2.** Traversée du Cyclone sur Maurice. Janvier 1945







**Fig. 3.** Diagramme de correspondance (très schématisé)  
entre la baisse barométrique et la vitesse moyenne du vent  
dans un cyclone idéal.





graduellement à 1,35 lorsque le vent soufflait en moyenne à 65 milles/heure. A Vacoas, sur le haut plateau le rapport correspondant fut un peu plus fort, comme il fallait s'y attendre : on trouve 1.6 pour le vent moyen de 30 milles/heure et 1.4 à 1.5 pour le vent au-dessus de 60 milles/heure.

Il est désirable pour le lecteur qu'on fasse clairement ressortir ce qu'il faut comprendre par "diamètre du cyclone" et les dimensions du calme central. Dans le cas présent, par exemple, le système dépressionnaire complet dont formait partie le cyclone proprement dit, avait un diamètre considérable de 800 milles, et son influence s'étendait au-delà même d'un rayon de 400 milles. Mais à l'intérieur de ce vaste système, le véritable tourbillon cyclonique n'occupait qu'une superficie assez restreinte. Ce qu'on a convenu d'appeler "l'anneau d'ouragan" n'avait dans ce cyclone qu'un rayon de 90 à 100 milles\*\* ; en dehors de ce vortex proprement dit, le vent n'atteint en général guère plus de 40 milles/heure de moyenne, avec des rafales de 60 à 65 milles/heure. Un intervalle de seulement quelques heures, pour un cyclone rapide, peut donc apporter un gros changement dans la violence du vent — car, tant que l'observateur n'est pas entré dans "l'anneau d'ouragan", la baisse barométrique reste lente et le vent n'augmente pas beaucoup. Ainsi, c'est entre 14 et 15 heures le 16 janvier, que le véritable ouragan aborda l'Observatoire à Pamplémousses, soit seulement 8 à 9 heures avant l'arrivée du calme central.

En ce qui concerne le calme central, il faut encore distinguer entre le calme plat de la région centrale même et la région de calme partiel qui l'entoure. C'est ce que le diagramme *très schématisé* de la figure 3 aide à comprendre. Lorsque la pression barométrique arrive à son point le plus bas (les oscillations passagères non-comprises), le vent ne cesse pas *sur le coup* ; † la vitesse décroît, *rapidement* il est vrai, vers le calme absolu, mais cela n'a lieu qu'au bout d'un certain temps. Ainsi la durée du calme absolu peut être relativement faible comparée à la durée totale du calme partiel pendant lequel le baromètre reste *presque* à sa limite inférieure. Dans le cyclone qui nous occupe, le calme partiel à Vacoas commença à 23 h 40 m pour finir à 2 h 40 m ; tandis que le calme plat n'a duré que 45 minutes ; le poste de Vacoas, n'ayant pas traversé le calme central tout à fait diamétralement, on doit évaluer le diamètre du calme absolu à 10 milles environ.

Pendant toute la durée du calme, les oscillations du baromètre sont en général très notables ; au calme absolu correspond une légère baisse supplémentaire de  $1\frac{1}{2}$  à 2 millibars, et c'est l'instant où la pression est à sa limite inférieure véritable ; mais la remontée rapide du baromètre ne se produit que sur le pourtour intérieur de "l'anneau d'ouragan", en même temps que l'augmentation brusque du vent.

\*\* Très souvent même moins dans d'autres cyclones.

† D'ailleurs, les principes de l'hydrodynamique ne l'admettraient pas.

Les données suivantes sur la durée des vents forts pourraient trouver leur utilité dans l'évaluation du désastre agricole.

Nombre d'heures pendant lesquelles la vitesse du vent a dépassé une valeur indiquée.

Poste d'observation	Vitesse soutenue en milles/heure							Vitesse des rafales en milles/heure				
	30	40	45	50	55	60		50	60	70	80	90
	h	h	h	h	h	h		h	h	h	h	h
Pample- mousses...	40	19	12	5½	4	2½		27	20	8	4	nil
Vacoas ...	46	19	14	9	6	1		45	32	9	5	¼
Plaisance ...	42	29	18	13	9	3		39	30	9	8	2

La totalité des pluies cycloniques, tombée en 3 jours se chiffre comme suit :

Pamplemousses 13".41 ; Vacoas 26".08 ; Plaisance 12".66.

## LA COUPE DE 1944

A. DE SORNAY

Statistician, Department of Agriculture.

La coupe de 1944 a produit 199.6 mille tonnes métriques de sucre c'est-à-dire, en chiffres ronds, 110 mille tonnes ou environ 86 o/o de moins qu'en 1943. La quantité de cannes manipulées a été de 1,764,207 tonnes métriques comparativement à 2,566,224 tonnes en 1943, ce qui fait une différence de 31 o/o.

L'extraction moyenne obtenue pour toute l'île est de 11.3 o/o, tandis qu'en 1943 elle fut excessivement élevée, atteignant 12.1 o/o.

Les chiffres donnés dans le tableau suivant font voir le pourcentage de réduction en sucre dans chaque district, comparativement à 1943.

District	Pourcentage de Réduction	
	Extrêmes	Moyenne
Pamplemousses ... ..	14.0 — 37.5	30.0
Rivière du Rempart ... ..	2.6 — 34.3	21.7
Flacq ... ..	31.4 — 38.8	34.4
Moka ... ..	35.7 — 42.6	40.5
Plaines Wilhems ... ..	35.3 — 39.4	36.6
Rivière Noire ... ..	37.1	37.1
Grand Port ... ..	32.5 — 49.3	39.0
Savanne ... ..	33.6 — 42.2	43.3
Moyenne vraie ... ..	—	35.7

La colonne de réduction moyenne nous permet de déduire que ce sont les localités du Nord de l'île qui ont le moins souffert l'année dernière tandis que le Grand Port, Moka et la Savane ont été les districts les plus affectés.

En ce qui a trait aux extrêmes de réduction, il est intéressant de faire remarquer que c'est dans le Nord où le pourcentage de réduction pour chaque usine a le plus varié. A Pamplemousses et à Rivière du Rempart, la différence entre les deux extrêmes est de l'ordre de 23.5 o/o et 31.7 o/o respectivement, tandis que dans les autres districts, cette différence n'est que de 4.1 à 8.9 o/o.

Nous sommes d'opinion que ces variations sont dues aux conditions climatiques qui ont prévalu pendant l'année, mais sont surtout le résultat du cyclone d'avril 1944 qui a affecté les différentes parties de l'île d'une façon irrégulière.

Comparons maintenant les chiffres de la coupe de 1944 à la moyenne des neuf années précédentes ; c'est à dire, de 1935 à 1943, à l'exclusion de 1939.



Période	Sucre réalisé mille tonnes métriques	Cannes mani- pulées tonnes métriques	Extraction o/o
1944	199,6	1,764,207	11,3
1935 à 1943	315,9	2,688,594	11,7

La coupe de 1944 est la plus faible depuis 1935 ; même 1939 qui fut une année à cyclone et sécheresse produisit 229.4 mille tonnes de sucre.

En ce qui concerne les rendements en cannes, nous n'avons pas encore suffisamment de données des différentes propriétés pour établir des comparaisons exactes avec les années précédentes, mais, il va sans dire, que ces rendements ont été en général désastreux. Du reste, le tonnage global de cannes récoltées en 1943 (2,566,224 tonnes métriques) et 1944 suffit pour nous donner une idée précise de la diminution moyenne des rendements à l'arpent, compte tenu bien entendu, de la réduction à apporter à la superficie de 1943 en raison de la culture des plantes vivrières sur les terres à cannes.

Le but principal de cet exposé étant surtout l'étude des causes de la réduction si prononcée de la coupe de 1944, nous ne nous étendrons pas plus longuement sur la comparaison entre cette coupe et celles des années précédentes. Nous analyserons particulièrement les principaux facteurs réduisant la récolte de 1944 pendant la période de végétation et de maturation.

La coupe d'une année quelconque, c'est-à-dire, la quantité de cannes et de sucre produits, la richesse, l'extraction etc. est la résultante d'une multiplicité de facteurs agissant isolément ou simultanément. Nous attribuons les mauvais résultats de 1944 aux effets des facteurs suivants :

(1) Conditions climatiques défavorables. (2) Mauvaises conditions de culture. (3) Manque de fertilisants. (4) Réduction de la superficie cultivée en cannes. (5) Prolongement de la coupe de 1943.

L'énumération de ces facteurs n'est pas en ordre d'importance. L'influence de certains d'entre eux a pu prévaloir dans certaines localités seulement.

En dehors des facteurs précités, il existe aussi des impondérables, dont il est difficile, voire même impossible, de mesurer ou d'analyser les effets sur la production sucrière.

### (1) Conditions climatiques.

Les conditions climatiques pendant la période de coupe 1943-1944 furent, en général, très défavorables.

(a) *Pluviosité.* Au point de vue pluviosité, nous pouvons résumer la situation en disant que la saison de croissance fut caractérisée par l'alternance de périodes très humides et de périodes très sèches. Une sécheresse sévit vers fin 1943, et ce n'est que pendant la seconde quinzaine de décembre que d'abondantes précipitations se produisirent. Puis, survint la

sécheresse en janvier 1944, la pluie globale de ce mois faisant considérablement défaut. En février et mars suivants, la pluviosité fut bien au-dessus de la normale. En avril il y eut des précipitations massives d'eau et les inondations firent, probablement, plus de mal que de bien.

La pluviosité retomba au-dessous de la moyenne en mai et juin, ce qui fait que la canne ne trouva pas les conditions requises après le cyclone d'avril.

En juillet la pluviosité fut sensiblement au-dessus de la normale, tandis qu'en août, elle redevenait déficitaire. Enfin en septembre un troisième cyclone, heureusement de faible intensité, passa dans nos parages, nous donnant beaucoup d'eau particulièrement dans certaines localités.

En résumé, les conditions de maturation furent anormales en 1944.

(b) *Température.* La température fut en général soit normale ou au dessus de la normale même pendant la saison de maturation. En 1943, par contre, l'hiver fut froid et les températures se maintinrent basses jusqu'en novembre, et l'extraction fut exceptionnellement élevée (12.1 o/o).

(c) *Cyclones.* La coupe de 1944 subit les effets de trois cyclones qui sévirent en février, avril et septembre. Le premier cyclone qui évolua au début de février fut accompagné de fortes précipitations, mais, l'intensité des vents étant faible, ce météore ne causa pas de dommages apparents à la canne d'après les observations faites à cette période. Le cyclone d'avril, par contre nous fit beaucoup de mal, et les pertes en cannes et en sucre furent considérablement plus élevées que les estimations. Le centre passa sur l'île voisine, et la vitesse du vent atteignit 52 milles à l'heure à l'Observatoire de Pampléousses, 60 milles au Réduit, 67 à Vacoas et 74 à Plaisances.

Après ces deux cyclones, nous fumes visités par un troisième météore en septembre. M. Marc Herchenroder qui décrit ce cyclone dans la Revue Agricole de septembre octobre 1944, nous dit que la formation d'un tel météore pendant ce mois de l'année est un fait excessivement rare, qui ne s'est produit que trois fois en 135 ans. Il fut heureusement de très faible intensité, mais les précipitations qui se produisirent pendant son passage, influencèrent défavorablement le processus de maturation de la canne.

La perturbation cyclonique de très faible intensité qui sévit pendant la seconde quinzaine de décembre n'affecta pas la coupe de 1944, mais par contre, eut d'heureux effets sur la coupe de 1945 en lui assurant un excellent départ.

## (2) Conditions de culture.

En raison des difficultés et du manque de main-d'œuvre, les travaux agricoles ne purent être exécutés convenablement et en temps opportun et, il est très probable que ce facteur de concert avec d'autres causes a eu une répercussion sur les rendements en cannes.

### (3) Manque de Fertilisants.

Depuis quelques années, la fertilisation de nos champs n'a pu se faire normalement en raison du manque de sels chimiques. Ce manque se répétant pendant plusieurs années consécutives, a eu un effet cumulatif avec des conséquences fâcheuses pour la culture. Les variétés de cannes actuellement sous culture donnent des rendements élevés, et il leur faut, pour se maintenir, une quantité adéquate de matières nutritives.

Les quantités massives d'eau enregistrées pendant plusieurs mois de l'année ont probablement aggravé la situation en causant de l'entraînement.

### (4) Réduction de la superficie sous canne.

Par ordre du Contrôleur des Approvisionnements, toutes les propriétés de 20 arpents de cannes ou plus, eurent à cultiver 27½ o/o de leurs terres en plantes vivrières, ce qui fait que la superficie totale sous canne diminua considérablement à partir de la coupe de 1943, pour atteindre son point minimum en 1944. C'est pourquoi nous disions au début de cet article, que pour faire des comparaisons exactes entre la coupe de 1944 et celles des années précédentes, il faudrait tabler sur la même superficie sous culture, et tenir compte de cette réduction.

### (5) Prolongation de la coupe de 1943.

En raison des difficultés de main-d'œuvre, la coupe de 1943 se termina tardivement, et, par le fait, eut une répercussion sur les repousses à couper en 1944. Pour citer un exemple, extrême, la propriété Valona termina sa coupe en janvier 1944.

### La Morve Rouge.

Avant de terminer cet exposé, il nous faut dire quelques mots de la morve rouge qui s'avère inquiétante parmi les maladies de la canne à Maurice. La M. 134/32 étant sensible à cette maladie et la superficie sous culture de cette canne s'étant considérablement accrue depuis ces dernières années il y a donc lieu de s'en inquiéter. M. P. O. Wiehe, Phytopathologiste du Département de l'Agriculture, arrive à la conclusion que les dégâts causés à cette canne ont été beaucoup plus considérables en 1944 que durant les années précédentes et que l'extension de cette maladie l'année dernière est probablement due aux effets du cyclone d'avril 1944.\*

Il faudrait donc ajouter la morve rouge aux autres facteurs ayant affecté la récolte de 1944.

\* Voir Revue Agricole Vol. XXIII, No. 6. p. 242.



## LE PRIX DES SUCRES DE LA COUPE 1944.

PIERRE PIAT

Après une longue attente, les Planteurs ont été avisés, le 12 Janvier dernier, du prix qu'ils recevront pour leur récolte 1944-45.

Pour bien comprendre la situation, il faut se rappeler que, dès la fin de 1943, le Ministère des Approvisionnements nous a fait connaître son intention d'acheter nos sucres année par année, et non plus récolte par récolte.

C'est ainsi que le prix de  $15/9\frac{3}{4}$  par hundredweight c.a.f., convenu pour l'année 1944, s'est appliqué à tous les sucres embarqués au cours de l'année, qu'ils fussent de la coupe 1943 ou de la coupe 1944.

De même, cette année (1945), le Ministère nous a offert 2/- de plus que l'année dernière, soit  $17/9\frac{3}{4}$ , pour tous les sucres qui seront embarqués en 1945.

Cela fait donc qu'une partie de la récolte 1944, celle exportée en 1944, a reçu  $15/9\frac{3}{4}$  par hundredweight, tandis que l'autre partie, qui sera exportée cette année, recevra  $17/9\frac{3}{4}$ .

Or, la quantité embarquée au 31 Décembre dernier représentant presque exactement 50% de notre chiffre exportable, il revient à dire que nous aurons une moyenne de  $16/9\frac{3}{4}$  pour toute notre récolte 1944.

Autant que l'on puisse être précis, l'équivalence de ce prix moyen est Rs. 10.22 par 50 kilos, net ex Syndicat, pour les sucres roux à 99°.

En sus de cela, et tout à fait indépendamment du prix lui-même, le Gouvernement Impérial nous accorde un boni de £ 2 par tonne sur tous les sucres exportés par nous en 1944, ce qui représente £ 509,382.

Cette somme devra être répartie comme suit :—

- (i) Un cinquième à tous les planteurs qui ont été contraints de faire des cultures vivrières.
- (ii) Quatre cinquièmes à toute l'Industrie Sucrière, pour la compenser d'autant des pertes subies en 1944.

Il est à prévoir que cette somme sera insuffisante à couvrir la totalité des pertes subies en 1944 ; mais, comme l'a dit l'Honorable Tristan Mallao au Conseil Législatif, les planteurs doivent tenir en ligne de compte les lourdes charges qui pèsent sur le Trésor Britannique du fait des énormes dépenses de guerre, et doivent exprimer leur gratitude au Gouvernement Impérial pour ce geste qui, incontestablement, les aide à sortir de la situation critique, où le cyclone de 1944 les avait mis.

Le Mauritius Sugar Syndicate, chargé de la répartition du boni, a préconisé le *modus operandi* suivant qui, ayant rencontré l'approbation du Gouvernement local, a finalement été adopté :

En ce qui concerne le cinquième revenant aux producteurs de plantes vivrières, il a été décidé de l'allouer au prorata du nombre d'arpents cultivés par chacun d'eux.

L'étendue obligatoirement consacrée à ces cultures étant d'environ 33,500 arpents, chacun recevra donc Rs. 40 en chiffre rond par arpent.

Pour ce qui est des quatre-cinquièmes du boni, il s'agit, en principe, de comparer la coupe déficitaire de 1944 à un chiffre de base, afin de connaître la perte subie dans chaque cas, puis de compenser chacun en proportion de ses pertes.

Le choix du chiffre de base ne fut pas chose facile, car les opinions étaient très partagées à ce sujet.

Certains pensaient que l'année 1943 était indiquée pour servir de base de comparaison, tandis que d'autres trouvaient qu'il valait mieux adopter une moyenne de trois années, préférablement 1940, 1941, et 1942.

Finalement, l'accord se fit sur une moyenne de deux solutions, c'est-à-dire une moyenne de la coupe de 1943 avec la moyenne des coupes 1940, 1941 et 1942.

Réalisant les difficultés insurmontables (provenant des mutations, successions etc.) qui se seraient présentées dans la pratique si l'on avait eu à établir le chiffre de base individuel de chaque planteur, gros ou petit, le Syndicat a décidé d'adopter la méthode suivante, un peu empirique, c'est vrai, mais seule praticable :

Chaque usine, avec les planteurs de sa région, sera considérée comme une unité distincte; la perte de chaque unité sera calculée en comparant sa récolte de 1944 à son chiffre de base, et la compensation revenant à la région sera distribuée parmi usiniers et planteurs, au prorata de leur production individuelle de 1944.

Cela revient à assumer que la perte subie *du fait du cyclone* est proportionnellement la même pour tous les planteurs d'une même région, ce qui n'est pas déraisonnable.

Cette méthode a aussi le grand avantage d'être beaucoup plus rapide, permettant, selon toute probabilité, une répartition au début de Mars.

Il est bien entendu que le cas des deux usines qui ont fermé leurs portes depuis 1940, c. à d. Argy et Valona, aura à être traité particulièrement.

Les planteurs dont les noms figurent au Syndicat seront réglés par l'entremise de leurs courtiers, qui sont en fait leurs agents accrédités sans que ceux-là ne soient autorisés de ce fait à percevoir aucun courtage, tandis que ceux qui ont vendu leurs cannes directement à l'usine ou à un intermédiaire recevront leur compensation de l'usine ou de l'intermédiaire, et cela, toujours sans aucune déduction.

## THE NUTRITIVE VALUE AND MANUFACTURE OF FOOD YEAST

R. D'AVICE

Sugar Technologist & Registrar Central Board, Department of Agriculture.

Considerable progress has been achieved since the turn of the century towards the improvement of human diet. The present standard of food requirements includes an adequate ration of proteins, fat, carbohydrates, mineral salts, as well as a supply of various vitamins not only essential for the preservation of normal physiologic function but necessary to protect the human body from the minor ills of life.

It is, however, not always possible to supply colonial peoples with an adequate diet. The first report of the economic Advisory Council's Committee on colonial nutrition, published in 1939, stresses the fact that high-class proteins and vitamins of the B-complex are among the principal deficiencies of tropical diets.

In Mauritius we have carbohydrates but we are dependent to a considerable extent on imports for our requirements in proteins and fats.

Intensive work has been done by the Imperial Government towards improving the diets of colonial peoples and as far as proteins and vitamin B-complex requirements are concerned, a company, known as Colonial Food Yeast Ltd., sponsored by the Colonial Office, has been formed with a view to carrying out in British Colonies the manufacture and distribution of Food Yeast. Molasses or even sugar juice or sugar will be used as a source of carbohydrate. The scheme is financed by the Colonial Development and Welfare Act of 1940, the first factory is due to start operation in Jamaica this year. The factory will produce 12 tons of dried yeast per day and it has been designed to work according to the methods developed by the micro-biological section (under Dr. A. C. Thaysen) of the Department of Scientific and Industrial Research Laboratory at Teddington, (1)

Yeast has always played an important role in the welfare of the human race, it finds an important place in nutrition, industries and medicines. All organisms which could convert carbohydrate to alcohol were formerly known as yeast. Yeasts may be defined as micro-organisms of the fungi group, unicellular, spherical or oval in shape and which multiply by budding.

(1) For more details on the question the reader is referred to "Food Yeast — A Venture in Practical Nutrition" published by Colonial Food Yeast Limited.



Yeast like other organisms grow best under certain conditions of temperature, humidity, light, reaction of media etc. In the presence of air, yeast decomposes sugar for maintaining protoplasm and forming new cells, part of the sugar being oxidised to carbon dioxide and water, very little or no alcohol is produced. Under anaerobic conditions most of the sugar is converted into alcohol and carbon dioxide and the growth rate of the yeast is very slow. In the manufacture of alcohol there is, however, a certain amount of air present so that the process is not purely anaerobic.

Numerous investigators have shown that yeast possesses a high protein value. Experiments have been carried out on men, pigs, stock animals, chickens, rats etc. It has been demonstrated that the nutritive value of yeast is higher than that of vegetable proteins. There is no difference in the nutritive value of food yeast, brewers yeast or bakers yeast.

There is great divergence of opinion concerning the amount of protein which should go into a normal diet but if we take the League of Nations' standard which is a protein requirement of not less than 1 gram of protein per day per kilogram weight, (the protein should be derived from a variety of sources and it is desirable that part of the protein variety should be of animal source) our average labourer would require about 60 grams of protein per day. An idea of the food requirements to furnish that amount may be obtained from the following protein contents of 100 grms of various Foodstuffs (1):—

Bread white ...	7.9	Beef roast, lean and fat ...	21.3
„ wholemeal ...	8.4	Cod steamed ...	18.0
Rice boiled ...	2.3	Beans, haricot boiled ...	6.6
Milk (100 c.c.) ...	3.3	Peas fresh boiled ...	5.0
		Potato boiled ...	1.4

Dried Food yeast contains (on fresh matter basis) 43 o/o of protein and Brewers yeast 50 o/o of protein.

Yeast apart from its high protein content is of special value for its vitamin content. It is one of the richest sources of vitamins of the B-complex. Food yeast, bakers yeast and brewers yeast contain (on fresh matter basis) respectively per 100 grm 2, 3 & 16 mg of thiamine hydrochloride ( $B_1$ ), 5, 7 and 4 mg of Riboflavin ( $B_2$ ) and about 42, 35 and 37 mg of nicotinic acid.

Vitamins are essential for oxidation processes, for growth and to promote absorption of mineral salts. Vitamins prevent Beriberi, scurvy, skin diseases etc. Thiamine hydrochloride is used against Beriberi, fatigue, insomnia, weakness. Riboflavin promotes growth, oxidation processes, prevents angular stomatitis. Nicotinic acid is a cure for pellagra.

(1) reproduced from "Food and Planning" by J.R. Murrack M.D., D.S.O., M.C.

Under normal conditions, in a land of plenty, where food is mixed, varied and cheap, yeast may not be expected to play an important part in the diet, but under local conditions where the diet consists mainly of carbohydrates, a cheap supply of protein and vitamin B-complex should be a valuable asset in the feeding of men and animals. Yeast provides protein at a much lower price than meat or milk. It is estimated that on a large scale Food yeast may be produced locally at about Rs. 0.25 per lb. Yeast is acceptable to all communities. It should indeed play an important part in Mauritius where strong racial and religious prejudice exists against the consumption of meat.

If we take our average requirement to be 15 grams of yeast per head of population per day, we shall require about 2,200 tons of yeast annually, that amount can be manufactured from about 7,400 tons molasses and 1,700 tons chemicals. For the same amount of protein in the form of beef, under present grazing management, a minimum of 150,000 acres of land would be required.

Food yeast has a slightly meaty taste. It can be mixed with water or milk or introduced into soups, stews, sauces with an improvement of flavour. It can be incorporated in toffees, biscuits, bread etc.

The probabilities are that a Food yeast factory will be erected in Mauritius as soon as circumstances will permit. As this however might take some time due to difficulty of supply and transport, we should in the mean time make greater use of the yeast produced locally in our distilleries. Dr. G.R. Sippe (2) has shown the beneficial effect of yeast obtained locally in the manufacture of alcohol in cases of nutritional macrocytic anæmia. Due to the efforts of Captain Wilson (3) and others, a certain amount of distillers yeast finds its way in the human diet but a much greater amount in the dried form could be made available to the public. In the rearing of pigs, chickens and cattle a small amount of yeast would considerably improve the diet. Before dealing with this question let us first briefly describe the technique followed at Teddington for the manufacture of Food yeast. The yield obtained is 60 o/o on sugar under aerobic condition and makes possible the production of yeast from molasses at a low cost. The type of organism selected is *Torulopsis utilis*, a special strain known as *Torulopsis utilis* var *major* has been developed. Another special strain which grows at 39°C has also been developed, this is of special interest in the tropics where the temperature of the cooling water is relatively high.

The molasses are diluted so as to give a concentration of about 10% carbohydrate (18° Brix). The impurities are removed by adding 2.4 kgs of arsenic free triple superphosphate per 100 kgs of molasses, the solution is

(2) British Medical Journal — May 13, 1944 p. 656.

(3) Revue Agricole, 22, No. 6, pp. 287-291.

then boiled and two litres of ammonia per 100 kgs of molasses are added. The precipitate formed is allowed to settle and after a few hours the clear supernatant liquid is drawn off and boiled again for 30 minutes. (The method of clarification to be adopted may of course vary according to local conditions and cost of chemicals). Experiments carried out locally have shown that molasses may be filtered by the following treatment: The diluted molasses are boiled for a few minutes and allowed to decant for 1 to 2 hours. The percentage of muds is only about 4%. The supernatant liquid is then filtered through standard cotton cloth. The rate of filtration being very rapid. A 600 sq. ft. filter may deal with 45 tons tons of molasses per 24 hours. Sufficient wort and water are admitted in the "fermenter" so as to obtain a solution of 0.5 o/o carbohydrate. The liquid is boiled to kill all vegetable cells. To avoid boiling, water treated with chlorine may be used, but in this case the vessel must be previously sterilised with steam. Next is added arsenic free triple superphosphate and ammonia or ammonium phosphate so as to obtain a phosphorus content of 0.006 o/o and a nitrogen content of 0.024 o/o.

The reaction of the wort is adjusted to pH 4.5 and filtered air is injected at the rate of 1 cu. ft. per minute per gallon of wort. A culture of the organism is then introduced so as to give a density of population of about 100 million per c.c. of *Torulopsis utilis*, var. *major* or 200 million per c.c. of *Torulopsis utilis*. The organism is added in the form of a cream prepared from a pure culture grown on wort agar slope, the culture is transferred to a nutrient solution incubated at the required temperature and then grown in a laboratory vessel until sufficient cream is obtained.

The temperature is kept at the optimum point, which is 30 °C for the ordinary strain and 39 °C for the special strain developed at Teddington. The rate of growth is somewhat slow at the beginning, but after a lag period of 2 to 3 hours there follows a logarithmic rate of growth of the population of 1.4 per hour until it reaches a certain density, the rate of growth then decreases. The population at the end of the process is about 1,200 million cells per c.c. in the case of the major strain and double that amount in the case of the ordinary strain.

The food substances required for growth have to be added as fast as the initial amount present is consumed. The amount to be added every hour is calculated according to the rate of growth, the wort is added in a continuous flow, the nitrogen and phosphorous may be added every hour. Analyses, including pH determinations, are performed frequently so as to ascertain whether all is going well.

The process may be continuous: every hour 25 o/o of the volume is withdrawn from the vessel and is replaced by wort of a carbohydrate content of 4.5 o/o.



From the fermenter the wort containing 2.2 to 2.4 o/o dry yeast is run into a de Laval Yeast Separator and the cream obtained washes with water and passed through a second separator. The process of washing is repeated again if necessary. The final cream is passed over horizontal heated steam rollers and a dried yeast in the form of flakes containing about 5 o/o of water is obtained. The flakes which are very bulky may be reduced to powder form in a rotary grinder.

In the manufacture of alcohol as locally practised the yeast sediment after fermentation has ceased, amounts to about 125 litres per ton of molasses containing 11 o/o of dry matter. Accounting for a loss of 10 o/o during washing, 13 kgs of dried yeast may be recovered per ton of molasses.

Small de Laval yeast separators capable of dealing with 1,000 litres of wash containing 1.5 to 3 o/o yeast per hour may be obtained from the Alfa-Laval Cy., Brentfort, England.

A steam dryer may be constructed locally, the writer would gladly communicate to any interested person the plan of such a dryer as well as a flow diagram of the process he proposes to use for obtaining dried distillers yeast. The clarification of molasses prior to fermentation is advisable if the yeast is intended for human consumption as it would give a product of lower ash content. Molasses coming from sulpho-defecation factories should not be used, the presence of calcium sulphate in the yeast being objectionable. The wort must be strained through a mesh fine enough to prevent stoppage of the nozzles in the separator by foreign material larger than the orifice diameter in the discharge nozzles.

A distillery equipped to manufacture dried yeast would have the advantage of being able to turn out more yeast and less alcohol (simply by blowing a certain amount of air in the fermenters) if the condition of the market so demands.

An estate having a distillery could produce yeast cheaply for its live stock by using the following procedure :

An ordinary centrifugal is fitted with a 1/32" metal sheet at the interior of its basket. On spinning, the yeast separates and adheres to the metal sheet. The clear liquid is removed by means of a skimming pipe adjustable for depth of cut. The machine is stopped and discharged from time to time. The yeast is mixed with bran and dried in the sun.

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## SOME OBSERVATIONS ON THE BEHAVIOUR OF RAW CANE SUGAR STORED FOR A PERIOD OF FROM ONE TO THREE YEARS. (I)

LOUIS BAISSAC

Consulting Sugar Technologist.\*

In December, 1942, the writer went to the island of Réunion, at the request of Messrs. Blyth Brothers, of Mauritius, acting on behalf of the Ministry of Food, to examine the condition of sugars manufactured in 1940, 1941 and 1942 and still stored in the island. The average polarisations for these three crops were 98.0, 98.4 and 98.6 respectively.

During his investigation which lasted one month, the writer noted certain interesting facts some already mentioned in the literature on the subject, from observations in other countries, others which do not seem to have yet been recorded.

The most striking fact was that as a rule, sugar in bulk showed no signs of deterioration whatsoever, except in one or two thoroughly unsuitable stores. A crust about half an inch thick formed over the surface of the piled sugar, which crust seemed to act as a protecting shield. Under the crust, the sugar was loose and well preserved.

The usual method adopted for storing in bulk was to build a wall a few feet from that of the godown, by stacking up a single or a double row of bags of sugar, from the floor almost to the ceiling so as to relieve the stone or other walls of the building from pressure and to fill in the sugar to as near to the roof as possible. In all the godowns with such a protective wall of bags, it was noted that the bags near the openings had absorbed moisture, but not the sugar in bulk, in contact with the bags, nor the sugar at the surface of the heaps.

The absorption of moisture by sugar in bags may be due to the fact mentioned by Tempany and d'Emmerez (2), that jute is a moisture-absorbing substance. The absorption of moisture by jute bags depends, of course, on the relative humidity of the atmosphere, which affects also the absorption of moisture by sugar and on the condition of the sugar, when bagged.

Many of the godowns in which sugar was stored, were not originally

\* Part of a lecture delivered at a meeting of the "Société des Chimistes de Maurice" in French, on March 17th, 1944

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built for such a purpose. Most of these, however, were made water and air-tight, as far as possible. All the openings were blocked and access to the godown was left by one or two doors only, according to the size of the building. Some of the stores were decidedly bad and in these (particularly in the towns, where sugar was stored in every possible building, including classrooms in Colleges and Schools) there were signs of deterioration in bulked as well as in bagged sugar.

When storage capacity began to be a serious problem, new godowns were built and very well built indeed some by sugarfactory owners, others by Government. These new stores were built water and air-tight. In these and a few other stores, there were no protective walls made of bagged sugar, for bulk storage. In some cases the sugar met the bare walls and floors; in others, vacoa matts (*Pandanus* sp.) were placed between the walls and floors and the sugar.

As a rule, godowns once filled, were never opened, except for inspection or control purposes. In some cases, however, such as at the Port of Pointe-des-Galets, bagged sugar being stored close to other goods, the buildings were left opened during working hours. In such stores there were signs of moisture absorption on the outer rows of bags. (i.e. those in contact with the atmosphere) but not on the inner rows the signs of moisture absorption diminishing with the increasing distance from the openings.

It was not possible, in most cases, to take samples of bulk-stored sugar from any part of the piles except near the roofs of the stores or near the openings. In two or three instances, however, the writer had access to godowns from which bulk-stored sugar was being removed for local consumption. It was then possible to observe more closely the behaviour of sugar in bulk. In one store, close to the sea-shore, the concrete floor of which was a few feet only above hightide level, there were no protective bag walls nor matting. The sugar was in a compact mass and being removed by cutting through a cross section from the ceiling to the floor. The caked sugar, which regained looseness through the action of pike and shovel, was being bagged for transport by road or rail. It was in a perfect state of conservation, except in contact with the floor, where it had absorbed some moisture on not more than 4 inches high. There was no moisture absorbed by contact with the concrete walls. The same state of good conservation was observed in bulk stored sugar in other localities.

With reference to bagged sugar, conditions were not as satisfactory. There were signs of moisture absorption on outer rows and near the roofs depending apparently more or less on the godow. From many bags showing damp spots, samples were taken after their contents had been emptied and thoroughly mixed to a homogeneous mass. Except in very bad cases, where the sugar had deteriorated and was considered good only for



alcohol manufacture, the drop in polarization compared with samples taken from dry bags, was very small, 0.3 to 0.5 of a degree. Such sugar, rebagged, would probably keep its polarisation several months, during storage and transit.

The worst case observed was in a small godown near the sea-shore, where the sea is usually rough and breaks a few hundred yards from the coast, the wind carrying the spray to the buildings facing the shore. The godown referred to was an old one, with doors facing the sea-front. The two or three thousand bags in it had absorbed moisture to such an extent that syrup was oozing and deterioration was very far advanced. In other godowns nearby, protected from the spray by other buildings and with doors facing inland, the state of conservation was satisfactory.

The authorities in Réunion estimated that 95 o/o of the stored sugar, as it stood, was suitable for exportation. I think that with rebagging, as mentioned above, 98 to 99 o/o would be exportable.

In conclusion, it may be said that the experience gained in Réunion confirms what has been observed in other raw cane sugar-producing countries, as far as bagged sugar is concerned : raw sugar and jute are moisture-absorbing substances ; when dry sugar bagged in jute is stored in water — and air-tight godowns, it will not deteriorate, even during long periods.

Raw sugar had never been bulk-stored for long periods, as far as the writer is aware, and the experience gained in Réunion shows that all conditions remaining the same, it will keep in perfect condition for year.

Curepipe, Mauritius, September, 1943.

- (1) This Report is published with the permission of the Ministry of Food and of the Bulk Purchase and French Committees.
- (2) "The Deterioration of White Sugar during storage in Mauritius". Department of Agriculture, General Series, Bulletin No. 24.

## LE CHARANÇON DE L'EUCALYPTUS, *GONIPTERUS* *SCUTELLATUS* GYLL.

L. ANDRÉ MOUTIA

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et

JEAN VINSON

Conservateur de l'Institut de Maurice.

L'apparition de ce coléoptère à Maurice ayant suscité un certain émoi dans les milieux intéressés, nous croyons opportun de signaler quelques faits relatifs à sa découverte et de faire connaître certains détails morphologiques et biologiques que nous avons eu l'occasion d'observer au cours de l'étude entreprise.

C'est au mois d'août 1940, au Réduit, que le premier exemplaire de *Gonipterus* fut trouvé à Maurice, sur un plant d'Herbe Condé (*Cordia interrupta*). Par la suite d'autres spécimens furent observés de temps à autre sur diverses plantes. L'espèce, qui ne semblait présenter aucune importance économique, fut laissée provisoirement indéterminée lorsqu'en novembre 1943 M. J. Guérandel, un étudiant du Collège d'Agriculture, nous porta de nombreuses larves et des adultes qu'il avait trouvés sur des feuilles d'Eucalyptus aux Quatre Bornes. En février 1944 le Conservateur des Forêts communiqua au Département de l'Agriculture des échantillons du même coléoptère pris sur des Eucalyptus au Quartier Militaire. Ces observations nous mirent sur la voie de l'identification que nous donnons aujourd'hui. Il s'agissait bien du fameux "Eucalyptus snout beetle", *Gonipterus scutellatus* Gyll., qui avait fait tant de ravages en Nouvelle Zélande et en Afrique du Sud. Les premières captures de l'insecte en question sur l'Herbe Condé, etc. n'étaient qu'accidentelles : ce n'était évidemment que des individus tombés de plants d'Eucalyptus se trouvant dans le voisinage immédiat.

Pour confirmer notre détermination nous priâmes M. H. K. Munro, Entomologiste au Département d'Agriculture de Pretoria, de nous communiquer quelques échantillons typiques de *Gonipterus scutellatus*. Bien aimablement il fit droit à notre requête et nous envoya deux espèces de *Gonipterus* : *G. scutellatus* et *G. gibberus* Boisd., autre espèce s'attaquant également aux Eucalyptus en Amérique du Sud. Après une soigneuse comparaison nous arrivâmes à la conclusion que notre espèce était positive-  
ment *G. scutellatus*.

## Description du coléoptère

Longueur 8 à 9 mill. — D'un brun noirâtre envahi de roux ferrugineux disposé sur les élytres en deux fascies obliques plus ou moins marquées. Corps recouvert d'une pubescence blanchâtre appliquée, assez clairsemée, sauf sur l'écusson et ses alentours où elle est très dense. Cette pubescence est particulièrement abondante sur la face inférieure du corps, surtout sur les côtés. Le roux ferrugineux est dû à une matière pulvérulente s'enlevant facilement par grattage, ce qui fait que les vieux spécimens frottés en sont souvent dépourvus.

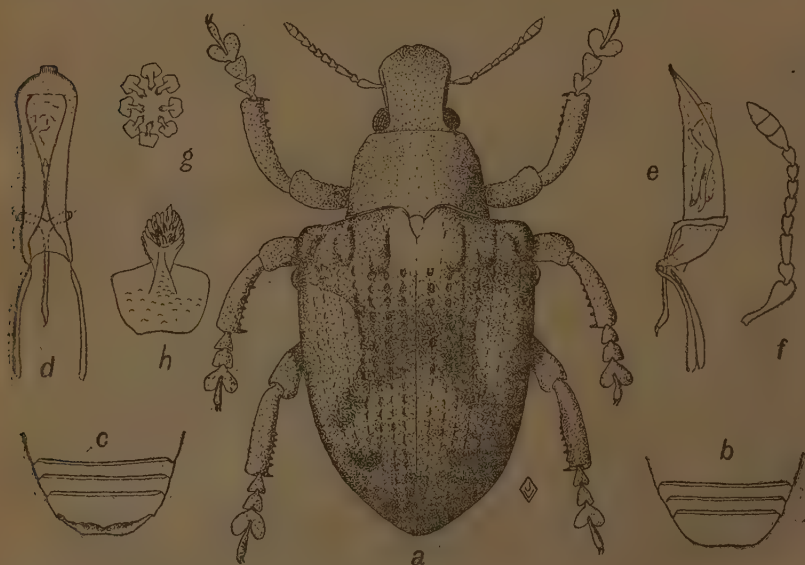


FIG. 1. *Gonipterus scutellatus* Gyll. a, insecte adulte,  $\times 8$ ; b, derniers segments abdominaux chez le mâle,  $\times 8$ ; c, derniers segments abdominaux chez la femelle,  $\times 8$ ; d, édéage du mâle, face dorsale,  $\times 15$ ; e, le même organe vu de profil; f, antenne,  $\times 14$ ; g, couronne de dents du jabot,  $\times 11$ ; h, une dent isolée,  $\times 54$ .

**Antennes** (fig. 1, f) droites ou à peine coudées, composées de 11 articles; le scape est court et la massue est formée de trois articles, le dernier portant vers le milieu un petit étranglement donnant l'apparence d'un quatrième article. **Elytres** portant chacun une série de quatre protubérances basales dont la plus grosse forme les épaules qui sont bien marquées; latéralement on voit près de la marge de l'élytre une cinquième protubérance. La base des élytres se prolonge légèrement de chaque côté de l'écusson en deux lames minces, largement arrondies, qui recouvrent



partiellement la base du pronotum. Il y a aussi une légère callosité sur la déclivité postérieure de chaque élytre. Les stries sont formées par de gros points enfoncés, assez irréguliers.

Le dessous du corps est déprimé longitudinalement au milieu ; le métasternum présente de chaque côté deux protubérances assez aiguës contre lesquelles la base des fémurs postérieurs peut s'appuyer.

*Pattes* courtes, surtout les tibias. Ceux-ci portent sur leur face interne une série de petites dents aiguës. Les fémurs portent aussi des petites denticulations mais elles sont beaucoup plus fines. Cette structure des tibias et des fémurs permet à l'insecte de s'agripper solidement aux brindilles et aux feuilles.

*Ailes* inférieures bien développées ce qui fait que l'insecte vole très bien.

Le jabot porte intérieurement une couronne de huit dents (fig. 1, g, h).

Les deux sexes sont à peu près semblables. La seule distinction que nous ayons remarquée est que le dernier sternite apparent de l'abdomen est plat chez le mâle (fig. 1, b) tandis que chez la femelle il porte à son extrémité un sillon transversal surplombé au milieu par une petite protubérance aiguë (fig. 1, c). Ce caractère est bien visible sur des spécimens éclaircis à la potasse et dont le revêtement pileux a été enlevé. Il peut cependant être observé quoique plus difficilement sur des spécimens non préparés ou même vivants.

*L'édéage* du mâle (fig. 1, d, e) porte à son extrémité un petit onglet rectangulaire.

*Gonipterus gibberus* Boisd., de l'Amérique du Sud, ressemble beaucoup au *scutellatus* mais il s'en distingue nettement par une taille plus grande (10 à 11 mill.), un aspect plus sombre, les élytres nettement fasciés de blanc cendré et tout à fait dépourvus de coloration rousse. L'édéage des deux espèces se ressemble beaucoup, la principale différence se trouvant dans l'onglet terminal qui au lieu d'être rectangulaire comme chez *scutellatus* est nettement dilaté à l'extrémité. Les dents du jabot qui sont concolores chez *scutellatus* portent deux bandes noirâtres chez *gibberus*.

### Description des premiers états et biologie

Les œufs sont déposés sur les feuilles tendres dans des petites capsules mesurant de 2 à 3 mill. de longueur sur 1 à 1½ de largeur. Ces capsules sont faites d'une matière plastique excrémentitielle dont la couleur qui est d'abord d'un brun clair devient plus foncée avec l'âge. Les œufs se trouvent placés horizontalement à l'intérieur de la capsule, au nombre de huit à douze. Ils sont jaunes, de forme allongée et mesurent environ 1 mill. de longueur sur un demi de diamètre.

L'incubation varie de 6 à 7 jours en été et de 9 à 10 jours en hiver. Aussitôt son éclosion la jeune larve commence à se nourrir du parenchyme de la feuille. Elle grossit rapidement et au bout de 18 à 20 jours atteint sa taille maxima qui, en moyenne, est de 11 mm. de longueur sur 4 de largeur. Elle est d'un jaune plus ou moins teinté de vert et porte de

chaque côté une ligne noire longitudinale et une autre plus vague au centre. Chaque segment porte plusieurs petits points noirs verruqueux régulièrement disposés. La tête est noire mais est peu visible, se trouvant enfouie dans les segments thoraciques. Bien que très agile cette larve est entièrement dépourvue de pattes. Les organes locomoteurs sont simplement constitués par des dépressions ovales, au nombre de huit, placées au centre des segments abdominaux. Ces dépressions agissent comme ventouses et permettent à la larve d'adhérer parfaitement aux feuilles ainsi que de se déplacer. Un curieux caractère de cette larve est le filament noirâtre plus ou moins long qui se voit à l'extrémité postérieure du corps et qui n'est autre que les matières excrémentitielles rapidement desséchées au contact de l'air.

Lorsqu'elle est arrivée au terme de son évolution la larve se laisse tomber sur le sol dans lequel elle pénètre à environ 4 ou 5 centimètres pour se transformer en nymphe. Elle y forme une petite cellule oblongue, très fragile, composée de grains de terre agglutinés dans laquelle elle se renferme pour se transformer en nymphe. Cette transformation en nymphe ne se fait pas immédiatement : la larve enfermée subit d'abord une période pré-nympheale qui dure de 12 à 15 jours. La période nympheale proprement dite est d'environ 18 à 20 jours. En résumé l'insecte passe de 29 à 38 jours sous terre avant de devenir adulte. Le cycle évolutif complet d'œuf à adulte varie entre six à dix semaines (49 à 79 jours) selon la saison. Il est donc particulièrement rapide à Maurice car en Australie, par exemple, sa durée est de dix à seize semaines. Ce qui fait qu'à Maurice les générations se succédant sans interruption il y en a au moins quatre par an, tandis qu'en Australie il n'y en a que deux complètes et une troisième incomplète.

**Cycle évolutif du *Gonipterus scutellatus* à Maurice pendant différentes périodes de l'année.**

	Fev. — Mars	Avril — Juin	Juillet — Août
Incubation de l'œuf ...	6 — 7 jours	7 — 9 jours	9 — 10 jours
1er stage larvaire ...	3 — 4 „	4 — 5 „	5 — 6 „
2e „ „ ...	3 — 4 „	4 — 6 „	6 — 7 „
3e „ „ ...	3 — 4 „	4 — 6 „	5 — 8 „
4e „ „ ...	5 — 6 „	6 — 8 „	7 — 10 „
Période larvaire ...	14 — 18 „	18 — 25 „	23 — 31 „
Période nympheale ..	29 — 31 „	31 — 35 „	32 — 33 „
Cycle de l'œuf à l'adulte	49 — 56 „	56 — 69 „	64 — 79 „
Température moyenne pendant le cycle ...	27.0°C.	23.6°C.	21.3°C.
Maximum ...	31.6°C.	28.9°C.	25.5°C.
Minimum ...	24.4°C.	20.0°C.	17.8°C.

## Distribution géographique

*Gonipterus scutellatus* est originaire de l'Australie. A une époque relativement récente il a trouvé accès à la Nouvelle Zélande puis à l'Afrique du Sud où il fut rencontré pour la première fois en 1916. Il existe également dans d'autres parties de l'Afrique, comme le Nyasaland, l'Afrique Orientale Portugaise, etc. A l'île Maurice, ainsi qu'il a été déjà dit, cet insecte a été remarqué en 1940 mais il devait y exister depuis quelques années. Il est maintenant répandu dans toute l'île, depuis le littoral jusqu'aux régions les plus élevées où se plante l'Eucalyptus.

## Plantes nourricières

Cet insecte vit sur les Eucalyptus en général et la plupart des espèces sont attaquées. A Maurice il se rencontre sur toutes les espèces mais il semble avoir une certaine prédilection pour l'*Eucalyptus robusta*, l'espèce à larges feuilles. On observe parfois des adultes sur des plantes autres que les Eucalyptus, comme les goyaviers par exemple, mais leur présence y est plutôt accidentelle. Cependant en Nouvelle Zélande les pommiers sont parfois attaqués en certaines saisons.

## Importance économique

*Gonipterus scutellatus* est un ennemi très sérieux des Eucalyptus. L'adulte et la larve en s'attaquant aux jeunes feuilles et aux tiges tendres nuisent considérablement à la plante. Lorsque les attaques sont répétées la pousse est retardée. Les bourgeons des repousses sont particulièrement affectés.

## Ennemis naturels

Les oiseaux et les crapauds doivent dévorer un certain nombre de scarabées et de larves mais apparemment pas en quantité suffisante pour maintenir l'insecte en échec. Les adultes sont parfois attaqués par un champignon entomophage, probablement du genre *Hirsutella*, rappelant beaucoup celui que l'on voit parfois sur la " mouche jaune " (*Polistes habraeus*). Mais tous ces ennemis ne semblent pas très importants et on peut dire que jusqu'à présent le *Gonipterus* se développe sans entraves à Maurice. On n'a pas encore trouvé ici aucun insecte parasite de ce coléoptère. Plus de 2000 groupes d'œufs ont été examinés et aucun n'hébergeait des parasites, de même que les 800 larves disséquées furent trouvées indemnes.

Dans son pays d'origine (l'Australie) le *Gonipterus* est attaqué par plusieurs parasites dont le plus utile semble être le petit hyménoptère *Anaphoidea nitens* Gir. qui s'attaque aux œufs. Ce parasite a été introduit en Nouvelle Zélande et en Afrique du Sud où il a donné des résultats très satisfaisants.

## Moyens de lutte

L'emploi d'insecticides pour lutter contre cet insecte n'est pas recommandable, surtout en raison de sa présence jusqu'au sommet des arbres les plus élevés. Même dans les pays où l'épandage de l'insecticide peut se faire par avion le degré de contrôle obtenu n'a pas justifié les dépenses encourues. De sorte que le seul remède pratique gît dans l'utilisation de parasites qu'il s'agirait d'importer à Maurice de l'Afrique du Sud.

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## PROPAGATION OF THE BREAD FRUIT (*Artocarpus incisa*) BY THE "SOLAR PROPAGATOR"

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Attempts to propagate bread fruit at Rodriguez had been made since 1924 with only a moderate measure of success. Plants were introduced from Mauritius, but it was soon found out that they did not acclimatize well. As soon as some plants had been established at the Experiment Station propagation by the common root sucker method was attempted; unfortunately, this method proved to be very slow and unreliable, so that by the end of 1937, the problem of raising sufficient bread fruit plants for Rodriguan farmers had not yet been solved.

Early in 1938 a "solar propagator" was built, experiments started in March and the results obtained were remarkably good. The number of seedlings raised was 200 in 1938 and 500 in 1939 as compared with less than 100 in 1937. It is interesting to note that this was achieved from root cuttings obtained from only two mother plants whereas with the common root sucker method it would have taken about twenty years to achieve what the "solar propagator" method did in two years.

### Propagation by root suckers

The bread fruit is commonly propagated by root suckers, which are produced when roots still attached to the parent plant are either bruised or cut. These root suckers are removed and transplanted as soon as they are mature, a stage usually indicated when they have developed a woody stem or when they bear lobed leaves, the early leaves of the suckers being entire. Failures are due to the fact that root suckers do not bear transplanting well, under local conditions, those which survive taking a long time to recover from the shock.

### Propagation by root cuttings in the Solar Propagator

#### 1. Season.

Work with the solar propagator is confined to the warm months of the year which at Rodriguez, extend from October to May. But for mass production one can start as early as August and the last root cuttings should be placed in the propagator by the end of November at latest.

## 2. *Mother Plants.*

Roots are dug with care from healthy and mature plants. A good indication is an abundant exudate of latex.

## 3. *Preparation of root cuttings.*

The freshly dug roots are cut with a sharp knife into pieces 8" long varying from  $\frac{3}{10}$ " and  $1\frac{1}{4}$ " in diameter. After cutting, the roots are dipped in a 2% solution of potassium permanganate to coagulate the latex.

## 4. *Treatment in propagator.*

The roots are placed on a sand bed in a horizontal position  $\frac{1}{4}$ " apart (Fig. 1, E) and they are covered with a layer of sand  $\frac{1}{2}$ " deep. This germinating bed is watered every morning.

## 5. *Examination.*

At the end of 45 days all the root cuttings are removed from the propagator, when it will be observed that a large number have developed tiny gall-like protuberances which are in fact masses of meristematic tissue (Fig. 1, b) from which adventitious shoots will develop. All root cuttings bearing these structures are grouped together and laid flat on the propagating bed with the protuberances facing upwards and covered with sand to a depth of  $\frac{1}{2}$ "; the other roots are also replaced in the propagator for further examination. A week afterwards suckers will appear and as soon as they bear a leaf the cutting is ready for potting out. In removing from the propagator five groups of cuttings are observed (Fig. 1, A): (i) cuttings bearing suckers without side roots, (ii) cuttings producing both suckers and side roots, (iii) some cuttings develop the suckers and two root systems, one on either side X, Z, (iv) a small percentage of cuttings will develop only roots X, (v) a last group will produce neither suckers nor roots. Luckily only a small number of roots fall under the two last groups. It is important to add that good seedlings are obtained from the type. (i), (ii) and (iii).

## 6. *Potting.*

After removal from the propagator roots of groups (i) and (ii) are treated as follows: the end nearest to the sucker is dipped in  $\frac{1}{2}$ % potassium permanganate solution and is next coated with paraffin wax. When treated in this way the seedlings will not suffer from root rot disease. The cutting is planted in the pot in a slantwise position with the paraffin end up, (Fig. 1, C). It is necessary to use a special type of pot (Fig. 1, D) so as to carry out final transplanting with minimum injury to the root system. The soil mixture of the pots consists of:  $\frac{1}{4}$  by volume of leaf mould,  $\frac{1}{4}$  by volume of sand and the rest light soil; no manure is used.







The young seedlings are placed in a shed five feet high thatched with coconut leaves and covered with gunny bags. In this way a light shade is secured. Under normal conditions at the end of two months the selected plants reach a height of 7" to 12". At this stage they are gradually hardened up by removing the gunny roof. This last operation takes about a month at the end of which the plants are ready. The whole process covers a period of five months. Over 80% of the root cuttings placed in the propagator germinate and produce seedlings.

*Acknowledgment.*—The author is indebted to Mr. C. A. O'Connor, the late Senior Agricultural Officer, who explained to him the principles of this method in 1936, and to Mr. R. Jauffret, the Agricultural Superintendent of Rodriguez without whose help the experiments could not have been carried out.

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† For a good description of the Solar Propagator readers are invited to consult A. V. Richards—The Tropical Agriculturist Vol. II page 269, 1936 : "Propagation of Citrus". For the propagation of the bread fruit the heating surface of the apparatus can be reduced by 50%.

## NOTES HISTORIQUES : LES ASPECTS DE L'ILE MAURICE

EN 1858.

Nous pensons intéresser les lecteurs de la Revue Agricole en reproduisant la narration faite par George Clark d'une excursion autour de l'île vers 1855. Ce récit publié dans le Mauritius Almanach de 1859 contient des observations très intéressantes sur bon nombre de propriétés qui existaient à cette époque aussi bien que sur l'aspect de la végétation, l'état des routes, et les habitants. La rareté des anciens Almanachs de Maurice, particulièrement celui-ci, nous a poussé à reproduire le récit in-extenso.

Rappelons que George Clark était un maître d'école à Mahébourg. C'était un fervent étudiant de l'histoire naturelle. Après avoir lu l'ouvrage de Strickland sur le Dodo il essaya mais en vain de trouver des ossements du Dronte dans les tranchées que l'on faisait en 1864 pour la construction de la voie ferrée de Port Louis à Mahébourg.

Un an plus tard cependant il entendit une rumeur à l'effet que M. Gaston de Bissy, propriétaire de l'établissement Plaisance, avait trouvé divers ossements dans la Mare aux Songes alors qu'il faisait enlever la terre d'alluvion contenue dans cette rive pour la répandre dans ses champs de cannes.

Clark se mit alors à l'œuvre et découvrit tous les os du Dodo à l'exception de quelques phalanges. C'est ainsi que le premier squelette du fameux oiseau a pu être établi.

Nous accompagnons cette reproduction d'une carte de l'île sur laquelle sont indiqués les noms de lieux cités dans le récit ainsi que le circuit parcouru.

P. O. W.

## A RAMBLE ROUND MAURITIUS

WITH

SOME EXCURSIONS IN THE INTERIOR OF THAT ISLAND

to which is added

A familiar description of its Fauna and some subjects of its Flora.

by a Country SCHOOL-MASTER

Two roads lead from Port Louis to the Northern and Eastern parts of the island : Pamplémousses road which forms a continuation of Des-

forges street, and Nicolay road, which is entered from Royal street. Pamplemousses road, which passes through what is called the Malabar Town, was, till within fifteen or sixteen years, the only way of exit from this side of the town. The increase of produce causing a great increase of traffic, public safety and convenience alike demanded another and a wider passage which was opened during the Government of Sir WILLIAM NICOLAY whose name it bears, as well as a handsome and substantial bridge, which crosses the ravine which bounds the town properly speaking on that side, and separates it from what is called the Yoloff Camp, so named from its having been the site of the dwellings of a party of that tribe, introduced under the French Government; and many of their descendants still reside there. Pamplemousses road crosses the lines of fortification surrounding that part of the Town by a narrow bridge formerly defended by a gate, the site of which is still spoken of as "the Lines Gates". On crossing this, a road is seen to the right, between that spur of the range of mountains called "La Montagne des Prêtres", the Pouce and the far famed "Rivière des Lataniers". This road traverses a valley called "La Vallée des Prêtres", from its having been originally assigned for the support of the Clergy of the Island, It leads to some estates situate in the angle formed by the Long Mountain, and the Montagne des Prêtres, and the celebrated Peterboth Mountain rises from its extremity. A somewhat precipitous foot path leads over the shoulder of Peterboth to a pretty valley on the other side of Long Mountain; and from the highest part of this path a prospect is obtained which well re-pays the toil of the ascent. The "Vallée des Prêtres" and the adjacent sides of the Mountains are principally cultivated for the supply of the Port Louis Bazar with fruits and vegetables, and the highest gardens there are cool enough to produce European vegetables much superior to those raised in spots near the level of the sea.

This valley is the site chosen by Bernardin de St. Pierre as that of the residence of Paul and Virginia, and the Rivière des Lataniers there takes its rise in a beautiful little nook in the Mountain side, densely shaded by *Rafia* Palms, the sombre foliage of which meeting across the stream completely excludes the sun shine.

An asylum for aged and infirm men is here maintained by the Municipality of Port Louis, and a neat Chapel, capable of accommodating about three hundred persons, built in great part by the voluntary labour of the poor of the neighbourhood, occupies a conspicuous situation on the side of the mountain. After leaving this valley, the road crosses a little plateau lying between the "Lataniers and Citron Rivers" and Nicolay road joins it shortly before reaching the latter. Immediately after crossing the Citron River, a road branching off to the left leads to a monastic establishment called, and well called "Riche Terre" the beautiful gardens of which under the care of their former proprietor, C. Wiehe, Esq: used to produce the finest vegetables which graced our Horticultural shows. This road is continued to the seaside, where there are some

charming little residences embowered in groves of Cocoa-Nut Palms and a beautiful estate called "Solitude".

"La Baie du Tombeau", which, like the "Rivière des Lataniers" owes its celebrity to a fiction, may be reached either by skirting the shore, or by following a road which passes by the "Riche Terre" Estate, and when reached I believe few will think fiction necessary to render it interesting. A pretty little water mill at its extremity is driven by the "Rivière du Tombeau" which there terminates, and the placid waters of the bay, sheltered by a bar of sand which crosses its mouth, offer a beautiful spot for boating. A considerable trade in stone is carried on from this bay, which supplies a great part of the enormous quantity of ballast required in Port Louis.

About two miles to the North of this is "La Baie aux Tortues", so named from the numbers of Turtle which formerly resorted to it, though now scarcely one in a year is seen there. In this bay in the early period of the settlement of Port Louis, there were manufactures and depots of naval stores called l'Arsenal: and some of the buildings employed for these purposes still exist in good preservation. A pottery, brick manufactory and Cocoa-nut oil mill on a somewhat large scale were established here by one of the most enterprising Creoles in the Colony, Mr. J. Dioré; but I believe they have not been found to answer from the difficulty of procuring a supply of skilled labor.

Large beds of coral, the remains probably of very ancient reefs, lie along the shores of this part of the island, and are dug for the purpose of making lime; that furnished by them being less affected by damp weather, than that made from fresh coral. Some solid masses of considerable size are also met with.

During the months of July and August, Whales may frequently be seen off this part of the coast; and as this appears to be the season at which they pursue their unwieldy gambolds with the greatest spirit, they afford a very interesting spectacle. The Pamplemousses River falls into this way.

About six miles to the North of this, on a promontory called Cannonnier's Point is a Quarantine establishment for immigrants suffering from small-pox, in which every provision is made for the comfort of the inmates, who are under the care of Dr. Ayres, a medical gentleman of established reputation. There is also a Light House upon it, to warn vessels from the very dangerous reefs with which it is surrounded, on which many ships have been wrecked at the very time that the dangers of the sea were supposed to be past. The projection on which the establishments just named are built, encloses a spacious and beautiful bay, called "La Grande Baie", in which small craft can at all times find a safe retreat in smooth water. It is much resorted to by the numerous coasters from the windward side of the islands, which frequently take refuge in it. The area of this bay is about a square mile. Its shores are of beautiful white sand, bordered with green turf. Many fishermen reside on its shores, and are



very skilful in the management of their narrow boats, the sailing and weatherly qualities of which excite the admiration of all who are able to appreciate them. By far the greatest part of the fish taken here, and indeed on most parts of the coast; is sent to Port Louis. The beautiful prospect and pure air of this spot would no doubt cause it to be more thickly inhabited than it is, but for the scarcity of water. Most of the inhabitants here drink water so brackish as to be excessively disagreeable to those unaccustomed to its use; but I have never heard that it produced any injurious effects on the constitution. Subterranean streams of fresh water run under many parts of the coast, and some, Mr West, for example, have been lucky enough to hit them in sinking wells, and have thereby obtained an inexhaustible supply of good water.

The land in this part of the island is such as would utterly discourage any European farmer. Masses of stones varying in size from that of a marble to many tons in weight strew the whole surface, and in many places not a particle of earth is to be seen until the stones are removed, when a fine rich loam is found. The fertility of this soil is such that all kinds of tropical plants thrive in it; and there is not perhaps in the whole world a soil more thoroughly adapted to the production of the Sugar Cane. In many fields alternate walls of stone and rows of canes are seen; and after some years, the stones are placed where canes grew, and canes are planted where the stones had been. Many vast heaps of stones are also to be seen, built together for the purpose of clearing the surface.

In many spots huge masses of stone crop-out, evidently upheaved by subterranean agency of vast power. Nearly at the Northern extremity of the Island, on the Estate called "Melville", belonging to James Currie Esq: is a place named "Roc en Roc", where an elevation of several roods in extent is composed of masses of stone of several tons weight, the form and position of which are so regular that they might well be supposed to be arranged by human agency, did an adequate object appear which might have called forth the mighty efforts which would have been necessary for raising such a structure. Contiguous to Roc en Roc an enclosure of an inlet has been made by the construction of a causeway across its mouth, forming a most valuable fishpond of about twenty five acres in extent, where an abundant supply of fish can be obtained at those periods when the weather prevents fishing in the open sea. Vast quantities of oysters are procured from the banks of this enclosure.

Proceeding along the coast, in an easterly direction, we reach St. Antoine, the estate of Mr Edmond de Chazal, a gentleman whose mansion has not only received the most distinguished strangers who have visited our shores, and charmed them with his princely hospitality, but has given refuge to many a shipwrecked mariner and passenger, and generously supplied their wants.

At a short distance from the shores of this estate lies the celebrated "Ile d'Ambre", the name of which probably derived from the quantity of that substance formerly found on its shores. This island forms part

of the Estate of the name, but is rented by Mr de Chazal, who preserves it as a warren, and rabbits and hares in vast numbers exist upon it. The coast is here studded with little islets and the shore is so irregular that scarcely a furlong of it is in a straight line. A short close bent covers it, even within the flow of the tide, and forms a favorite pasture of the coast.

A little to the South of "l'Ile d'Ambre" is the village of poudre d'Or, the name of which, I have heard stated, arose from the fine color of the sugar made in that neighbourhood. This, however, cannot be the origin of the name, as that was given many years before any sugar was made there; and I am quite at a loss for any reason to assign for such a nomenclature. This village is the site of the District and Stipendiary Magistrate's Courts for the District of Rivière du Rempart, and has a pretty little Church dedicated to St. Philomène, with a handsome Presbytery and a School attached to it, and also a Government School. A Company of Soldiers were formerly stationed here, the barracks for which still exist. There is a little harbour here at which the sugars from the neighbourhood are shipped for Port Louis. In proceeding along the coast from Poudre d'Or, we arrive at the picturesque establishment known by the name of "Haute Rive", situate on the precipitous bank of Rivière du Rempart, which here forms a deep but sluggish stream. A little farther Southward is "La Plaine des Roches", an undulating tract covering an area of several square miles, the surface of which, with little exception, consists of a layer of flat stone, generally of no great thickness. This is cracked and rent in all directions, and much of it is also seamed with shallow channels, giving it an appearance which I cannot illustrate more aptly than by comparing it to that of a copper of boiling soap, when the fire has been allowed to slacken. In the interstices of the stones, and in the mould has lodged in the hollows, trees and shrubs grow well; and this plain was once covered with timber of peculiarly fine quality. Very few trees now remain, but shrubs and grass are plentiful, and I believe there is not a spot on the island on which partridges are so abundant as they are here. I have crossed it many times, and at all hours of the day; and I do not remember ever to have passed without meeting with some.

On the Eastern side of "Plaine des Roches" in the estate called "Roche Noire", from a remarkable black rock, which gives its name to a point at its extremity. The fruit grown on this spot is very fine, and I believe the orange orchard to be one of the most productive in the colony, and its fruit equal to any. Under this estate are several extensive caverns, through which flow rivers of fresh water, always cool and limpid. Before reaching the sea, this passes through a large hollow in the rocks, on the shore, where its remarkable clearness must strike every one who sees it. These caverns are the resort of vast numbers of the Esculent Swallow; and an attempt was made many years ago to turn their nests to profit; but it was found that it would not pay to employ hired labour for collecting them, and I believe that from that time the birds have been left unmolested. The road from "Roche Noire" passes a tract composed of

alternate heights and hollows, in many of the former of which the same features may be observed as are noticed at "Roc en Roc". A remarkable inlet called "Bras d'Eau" gives its name to an estate contiguous to it. Cane fields may be seen here in which every hole is made by the crowbar. It seems evident that a mass of melted stone flowed over a stratum of good earth. This stone is in many places only a few inches in thickness, and the earth it covers is a fine loam of great fertility. Plantations on ground of this nature suffer much in dry seasons, and are also terribly injured by the borer; but in favorable years they yield a heavy crop of sugar of the finest quality.

A little beyond "Bras d'Eau" in following the coast, we arrive at the village known as the "Post of Flacq". There is here a most picturesque little harbour, with several islets in it, and sufficient depth of water for the small coasters which frequent it, craft of thirty or forty tons burthen, to lay alongside of the banks, and discharge and load without the use of boats. The islets are formed of large masses of stone, many of which are nearly cubical in form, consisting of coarse vesicular basalt. There are several stores here for the sugars shipped from the port. The pass to this little harbour is very narrow, and boats are often detained several days before they can get out, egress being much more difficult than ingress with the prevailing winds. Fish are abundant here, and crabs and oysters more so than in almost any other part of the coast.

There are barracks here for two Companies of men, with excellent officer's quarters; but they are destitute of water, which has to be fetched from the river at about a hundred and fifty yards distance. There is a Roman Catholic Chapel in this village; a plain wooden building capable of accommodating about two hundred persons. This village contains about six hundred inhabitants. Crossing a bridge over the "Rivière du Poste" we proceed along the coast, where pleasant low downs offer a most agreeable surface either to pedestrians or horsemen. Many ponds of brackish water, mostly bordered with sedge of brilliant green, diversify the aspect of the coast, and the largest of these, called "Belle Mare", gives its name to a very beautiful estate. This pond is one of the few spots in the Island in which teal breed; and it also abounds with moorhens. About two miles to the South of Belle Mare is the inlet known by the name of "Trou d'Eau Douce", from a large natural reservoir of fresh water which is there seen to the sea. This spot offers a pretty little cove for coasters, which ply between it and Port Louis. A village of some sixty or seventy houses surrounds it; and these being irregularly scattered on its steep sides, interspersed among masses of bare black rock, and trees and shrubs of various hues of green, with the little coasters at anchor in the tranquil cove, form a landscape of much beauty, still enhanced by the "Iles aux cerfs" a few hundred yards from the shore. These islands, four in number, comprise several hundred acres of pasture, and are leased by the Government to an inhabitant of the neighbourhood. The coast between this and Grand River S.E. is one of the prettiest that can be seen. The land rises rapidly from the shore, and when bare of the luscious crop of canes

which generally cover, it, offers to the eye a mass of huge rocks scattered in chaotic confusion. Near the "Pointe du Camisard" which forms the extremity of the embouchure of Grand River, is the fine estate Beau Champ, the second establishment founded in the Island for the production of sugar, Villebague being the first. On the Northern shore of the entrance to the river are the barracks, capable of accommodating a company of men, and forming one of the most delightful outposts in the colony for those who are fond of field sports, or boating.

Grand River S. E. here crossed by a ferry-boat, contains a vast mass of water, the lower part of its channel being more than thirty feet deep. Its embouchure is well worth visiting, and the proprietor of several of the coasters which ply here, Mr Jean Pastourel, is always ready to place a large boat and good crew at the service of visitors, whose gratification appears to be his greatest pleasure. The perpendicular banks of this river which consist of masses of compact and vesicular basalt, tufa of various degrees of hardness and porosity and a sort of sandstone filling the interstices of the other kinds, are clothed with shrubs and ferns, and their tops bear some good sized trees, the branches of which extend over the brink. Sea fowl breed in the numerous cavities afforded by these banks, and their nests often induce the young creoles to risk life and limb to obtain them. Having ascended about half a mile, further progress is arrested by a huge wall of rock, over which a beautiful sheet of water pours. This may be approached, except after heavy rains, with safety, and the ascent to the heights above the cascade offers no difficulty to a person of ordinary activity; but the slipperiness of the rock renders caution necessary at all times. Near the top of the cascade, in a ledge of rock on which the water does not fall in the dry season, is one of those remarkable hollows found in many of our rivers, but in few so large and symmetrical as this. It is a cylindrical basin about three feet in diameter and somewhat more in depth, hollowed in the hardest basalt, and with as much regularity of form as could be produced by the most skilful workman, who must expend a vast amount of time and labour to scoop out such a hollow. Eels of great size are found in the deep basin into which this cascade falls, and few creoles will venture to bathe in it, as well as many other similar basins, fearing to be attacked by them; but I have never heard of any one's being so attacked. Fish of many kinds are plentiful in this deep embouchure, as well as in the bay at its mouth; and sharks of considerable size sometimes enter it. About ten thousand tons of sugar are annually shipped from this place.

I know not that I can do better now than conduct my reader through some of the inland parts of the districts we have been coasting; we will therefore start from the village of "La Grande Rivière du S.E."

The high road from the landing place rises by a pretty sharp ascent, from the top of which a beautiful prospect is commanded both by land and sea. The islets mentioned just before, with the reef beyond them, extending all along the coast, and marked by a line of snow white breakers are on the right, while the "Montagne Blanche", so called I believe



from its calcareous cliffs of a light color which bound a portion of it, rises on the left. The "Rivière Profonde" takes its rise on the north side of this mountain, the plan of which is somewhat in the form of a roman Y, lying with the top to the east. Between it and "Montagne Fayence", which is here seen on the left in front, distinguished by a very well defined sharp conical peak, is a valley through which flows "La Rivière Sèche", fed by the streams which descend from the north side of Montagne Blanche, and the south of Montagne Fayence. This river rises very suddenly after rains, and its bed being shallow, with but a slight fall, it covers a great extent of ground when in flood. Its waters are seldom if ever turbid. There are six sugar mills in this valley, besides a great number of small freeholders. On the side of Montagne Fayence, on the left of the path which crosses it, is a mass of columnar basalt the prisms of which lay in an horizontal direction. This mass which I should roughly estimate at fifty tons weight, appears to have been thrown upon the spot where it lies, and it must have come from a considerable distance, as no rocks of similar formation are to be seen around it. A populous village has sprung up within a few years at the spot where the high road crosses the Rivière Sèche, and is extending both on the main road and on that which leads up the valley. At the north E. side of the Montagne Fayence are that estates on which the manufacture of sugar is carried on in the most approved system by means of the vacuum pan. These are : La Gaité, Bonne Mère and Queen Victoria. This last is famous as having been one of the first in the island on which the vacuum pan was used, and the first on which the centrifugal machine for drying sugar, called the turbine, was employed. These machines, the most useful of all the improvements introduced in the manipulation of sugar, were introduced by the late Hon. Edward Chapman, Esq : and used in the crop of 1852. On this estate sugar is produced equal to any in the colony, much esteemed in the Australian market under the title of "Snow drop". A little to the W. of those estates lies a straggling village known by the name of "Camp de Masque", from which a road leads southwards to another straggling village situate in a plain extending from Montagne Blanche to the Grand Port Mountains, called "Les Trois Islots", and traversed by "La Grande Rivière" and "Rivière Profonde". Some hundreds of the peasantry in this neighbourhood are employed in the manufacture of sugar bags, from the leaves of the Vacoa (*Pandanus Utilis*). These offer a never failing source of employment, and at the worst times enable those who make them to procure a good supply of the necessaries of life. In many of the country shops far more payments are received in bags than in money, and children may be seen going to purchase the provisions for the family use and carrying a few bags in payment. The shopkeeper prefers this to being paid in money, as he gets a profit on the bags as well as on the goods for which he obtains them ; and many persons have laid the foundation of their fortunes by this trade.

The "Trois Islots" consist mostly of a clay soil, and land there was of little value before the introduction of guano. They are now covered

with flourishing plantations, as yet unscathed by the terrible borer, and some mills containing all the recent improvements are built, where a very few years ago the land was scarcely deemed worth holding.

Indigo was formerly cultivated here, and the tanks for its preparation still exist in several places.

We must now retrace our steps to the high road near the Fayence Mountain, a little to the North of which is a considerable village known by the name of the district, "Flacq". The police Establishment District and Stipendiary Magistrates Offices, Prison and a Government School are all situated here; and the village is extending on all sides. About a mile from this, in a northerly direction, we reach the road leading E. to the Post of Flacq, and W. to Port Louis and near the junction of these cross, "La Rivière du Poste" by a bridge called "Pont Chevreau" and about a mile further on, the "Rivière Françoise", much esteemed for the peculiar softness and limpidity of its waters, in which grows in great abundance and with a development rarely to be met with on other streams the lovely water lily called "Le Nénuphar", (*Nymphaea Stellata*) a species peculiar to Mauritius, the blossoms of which are fully expanded exactly at noon, and begin to close almost immediately after.

A little beyond this bridge at the right hand side of the road is seen a splendid avenue of filao, leading to an estate called "La Retraite", the site of the tragedy of Mme Lehec, related in Bolton's Almanach of last year. Between the fifteenth and sixteenth miles is the estate called "Bon Accueil", on which the value of guano was first practically demonstrated. Proceeding towards Port Louis, we pass over a road to the right of which lies la Plaine des Roches, and to the left a number of scattered houses standing on a spot called "Les Mares" at the feet of the N.E. portion of Calebasse Mountains. Two branches of the Rivière du Rempart are next crossed, the bridge over the larger bearing the name of Pont Praslin, and a steep hill leads to a considerable village situate in what are called "les Plainés de St Cloud". From this height a beautiful and extensive prospect of the N.E. of the island is obtained, as well as of the adjacent islands in that direction, and vessels are frequently descried in the offing. To the left on this is the range of wooded heights called "Nouvelle Découverte", and to the right the highest group of hills in the Northern part of the island called, "Mont Piton" — a few years ago covered with fine timber which was considered of so little value that it was given to any one who would be at the trouble of clearing the land of it, the ebony trees, along being reserved for the proprietor. About ten miles from Port Louis are a few houses by the side of the road, and the site of the camp formerly occupied by the Indian convicts employed on the roads. This spot is known as "Ville Bague" and took its name from M. de Villebague, brother-in-law to the great Labourdonnaye, and his estate now called "Rosalie" was the first sugar estate planted in the island, and the boilers destined for it were on board the ill-fated St. Géran, wrecked in 1745. A fine view of the whole of the N. and W. of the island is commanded

from this spot from which there is a gradual and almost uninterrupted descent to the sea in those directions.

On the left of the road, just after crossing another branch of the Rivière du Rempart, edged with the Papyrus *Equalis*, is a square tower in a somewhat dilapidated state, called la Tour de Villebague. I have been informed that in this tower was fixed the wind mill which was first employed for crushing cane in this island. Immediately after passing this tower, a road to the left leads to Port Louis by a shorter cut than that passing through the village of Pamplemousses, and is called the Villebague road. One branch of this leading nearly due South, crosses the Callebasses river and runs up the valley lying between the Nouvelle Découverte and Long Mountain to the foot of Piterboth, and that part of the Callebasses chain called "Creve Cœur" over which a bridle road passes to the plains of Moka. In this valley Mr de Labourdonnais possessed an estate, part on which is now occupied as a Government School and about to be converted into a Mission Station for the Church of England Missionary Society, principally with a view to the instruction of the Indian labourers of the colony. Another branch turning to the westward, joins the Pamplemousses road between four and five miles from Port Louis. A gentle declivity about a mile in length leads from Villebague to the populous village of Pamplemousses. St Pierre's story has rendered this spot famous as that frequented by the families of Paul and Virginie, and modern speculation has profited by the interest excited by their story in the erection of two little monuments, entitled the tombs of Paul and Virginie; and so prone is the human mind to realize pleasant fiction, that many a tourist has carried away fragments of the brick of which these monuments are built, and cuttings of the willows which formerly grew by them, as real relics — relics indeed as real as the greatest part of those exhibited and honored as such.

A Roman Catholic Church capable of containing five or six hundred persons, stands on a green about the centre of the village; a spacious and substantial building, but as destitute of any architectural design as a barn. The cemetery adjoining this contains some handsome monuments, and in it repose the remains of some of the most distinguished natives of the colony.

A Government School, numerously attended, is kept in a building near the Church, and on the opposite side of the main road is a handsome gothic building, not yet finished, belonging to the Church of England. The officiating Minister in connection with this establishment, is the Reverend T. Wheeler, who performs Divine Service in an apartment, fitted up for that purpose in his own dwelling, pending the completion of the Church.

Pamplemousses was formerly the residence of the Governor of the colony, who inhabited a fine estate "Mon Plaisir" close to the village. The superiority of the climate of Moka in the warm season, the tempera-

ture of Pamplemousses differing little from that of Port Louis, probably caused a preference to be given to Réduit.

The greatest object of attraction to Pamplemousses is the Botanical Garden, which offers much that is novel to those arriving from Europe and much that is interesting and delightful to every admirer of Nature. The walks in it offer a most grateful shade to the traveller, and the considerate kindness of Mr Duncan, the Director of the establishment, has placed convenient seats in many places for the accommodation of visitors. One of the principal objects in the establishment of these Gardens, which date from about 1768, was the propagation of spice plants, especially cloves and nutmegs, of which some flourishing trees exist there, and are, especially when in bearing highly interesting to those who have never seen those spices except in their dried state. Another spice plant belonging to the same family as the nutmeg, called the Ravinsara, a native of Madagascar, is also seen here, as well as Cinnamon of several species. A great variety of Palms and Ferns have been introduced by Mr. Duncan, comprising some undescribed species of the former from Seychelles and Rodrigues. There are many plants of the Sago Palm, but I am not aware of its having ever been manufactured in the colony, though met with in many establishments. Among the Palms peculiar to this and the neighbouring islands, the Fan Palms, *Latania Borbonica* and *Latania Rubra*, are some of the most remarkable, while the Sea Cocoa (*Lodoicea Sechellarum*) is altogether singular both in its habit and habitat. A description of this will be found in another part of this work.

Those who are desirous of seeing newly introduced plants should address themselves to Mr Duncan personally, as all such are kept in his private garden till several subjects are secured; the thoughtlessness of visitors having, deprived the colony of a new or rare plant of which no duplicate existed.

Among new Palms introduced but lately in Mauritius, and only very recently described in any botanical work, is one peculiar to Seychelles this is called "*Latanier Hauban*" (the shrouded *latania*) from the remarkable manner in which its tall slender stalk is stayed. A series of roots spring above ground, like those from the vacoa, but forming a considerably greater angle with the main stipe. These continue to sprout in successive ranges from the circumference of the stem, until in old plants, they may be seen as much as twenty or twenty five feet long, and as thick as a man's arm. They do not penetrate the soil, but terminate just as these of the vacoa do, presenting at the end an appearance similar to the stump of an amputated limb. As they merely rest on the surface of the soil, they always slack to windward, and prop the stem in whichever way it may incline. These palms attain a great height, considerably exceeding a hundred feet. The pseudo-roots split very easily, and are generally employed by fishermen to form torches for night fishing.

They are a few specimens of the Baobab of Senegal here, of which Dr Livingstone, who has perhaps seen more of that tree than any other



European, says : that it might more properly be termed a gigantic bulb than either an endogen or exogen. The virtues of its fruit as a febrifuge are so well known by the creoles of the neighbourhood, that Mr Duncan cannot prevent their being stolen as fast as they ripen.

In that part of the Garden nearest the reservoir are some very fine specimens of the "*Urania Specioso*", or Traveller's tree, the Ravenal of the Madegasse of whose country it is a native. This remarkable plant has the stem of a palm, and leaves much resembling those the Banana, but springing only on two sides of the stem, and spreading out like a fan. Its flower is of the same formation and presents nothing very attractive ; but when the seeds are ripe, the pod splits open and discloses them, about the size of peas, enveloped in a fibrous covering of a most beautiful rich blue. The mid-rib of the leaves, with the lamina stripped off, is often used to form the sides of cottages, and lasts many years if not too much exposed to wet. They are cut to the required length and the concave side of one being adjusted to the convex part of another, they are attached together by a sharp stick thrust through them, and thus form a neat kind of wattle, very easily made. The young leaves are much used in the place of plates and dishes at Indian dinner parties. The English name "*Traveller's Tree*" was given on account of the supply of liquid which may be obtained from them, described by some writers as "always cool and limpid". This is nothing more than the dew or rain which falls on the concave leafstalks, and naturally flows to their base where it nourishes the stem. By piercing or cutting at the base of the leaves, a quantity of liquid, some cases amounting to more than a quart, may be obtained ; but it will be neither cool nor limpid except after very heavy rains. At most times it is tinged and flavoured by the decaying vegetable matter around it, and though it would doubtless prove grateful to a person parched with extreme thirst, it would never be drunk where good water could be procured. These plants were formerly very abundant in the plains about Vacoa, and also at Cent Gaulettes, growing, in both places, in a poor ferruginous soil.

Close by the Traveller's Tree are some fine specimens of the "*Rafia*" the "*Sugus Raffia*", another natives of Madagascar, and one of the plants most useful to the natives of that island. This palm delights in marshy ground, and grows very abundantly on the banks of many of the rivers of this colony. Its leaves form a much smaller angle with the stem than those of most other palms, and the leaflets which are of a sombre hue, are much less rigid than those of the cocoa-palm and the latanias. This plant flowers but once, at an age varying from fifteen to twenty-five years, according to soil and aspect, and dies as soon as its fruit is ripe, but it then produces an incredible quantity of fruit.

The seeds grow in branches on a stem often as much as ten feet long, and eight or ten of these immense clusters may be seen on the same plant containing in the aggregate many thousand seeds, varying in size from that of a pigeon's egg to that of a hen egg. They grow in detached brand-

ches united to one principal stem ; and each branch is covered with an envelope having much the appearance of leather, which effectually secures them from the weather. They are fusi form attached to the stem at the apex and are covered with valvate cordiform scales of a delicate brown hue, and as bright and smooth as porcelain. The kernel is almost as hard as a stone, and I do not know that any use is made of it, but the mesocarp which enclose it, consisting of a pellicule about one sixteenth of an inch in thickness has an aromatic bitter flavor and forms a favorite article in Madegasse cookery. The heart of the rafia is also eaten like that of the cabbage palm, but its most useful part is the young leaf, which is the material from which all the Madagascar matting is woven, and also the showy wrappers (pagnes) which the Madegasse wears on festive occasions. The mid-rib of the leaf is one of the strongest substances that can be found in proportion to its weight, being almost as light as elder-pith, and is used extensively for making hencoops and bird cages. For the latter the medullary portion alone forms the frame work, and the epidermis and also the mid-rib of the leaflets, the bars. This material is so easily worked that a common knife is the only tool required in the manufacture. Ladders are made of it, sufficiently strong for thatching the native huts, and it is also used for rafters and fencing. Three or four of these leafstalks form a raft on which a person might be supported in the water for many days.

There are also one or two of that altogether unique palm the *Lodoicea Seychellerum*, or Sea Cocoa-nut ; but they are not in such a state as to give any adequate idea of that singular and stately plant which was long a myth among botanists. Some of its enormous drupes having been drifted by the currents to the Maldiv Islands, it has been termed the Double Cocoa-nut of the Maldives ; and when it was known that the plant did not exist in those islands, it was conjectured to belong to some submarine tree, as it was frequently met with floating at sea. Fabulous virtues were ascribed to it ; amongst others that attributed to cups made of the horn of the Rhinoceros ; the neutralization or detection of poison contained in any liquid poured into it. Immense prices have been given for fruit, and even at present day they sell at about ten times the rate they fetched a few years ago, the Persians and Indians fancying that the kernel contains a certain restorative power particularly sought for in countries where polygamy prevails.

When the Seychelles Islands were discovered, the facts of their growth came to light but it is only within a comparatively short period that an accurate description of the growth and habits of the plant has been given to the world ; and this was due to the Literary and Scientific Institution of Seychelles, and was drawn up by the late P. Bernard, M.D. at that time Government Medical Officer of those Islands. This account was published in the transactions of the Royal Asiatic Society, but as that work is not very generally circulated, a short notice of the plant may be interesting to such of our readers as have not read the account alluded to.

This plant is not only peculiar to the Seychelles islands, but is indige-

nous only in three islands of that group, Praslin, Curieuse and l'Ile Ronde; all three in juxta position. These Islands, when discovered were nearly covered with forests of singular palm, many of which were a hundred feet in height. The finest specimens are met with in the damp gorges of the mountains, where a bed of rich humus is deposited by the washing of the hill sides. The stem is in general perfectly straight, and eight or nine inches in diameter. Let us now trace its growth from the time that the ripe nut falls upon the earth.

Within a few weeks of this period germination takes place, and a club shaped root, about an inch in diameter at the end, penetrates the soil to a depth of twenty or thirty inches. From near the bottom of this in about nine months from the commencement of the germination sprout a leaf at an angle of about forty five degrees with the root. This leaf is closely folded, and presents a hard, smooth surface and a sharp point. When it has attained a height of about two feet above the surface of the soil, it expands, and then offers little to distinguish it from the leaf of a fan palm, which about equals it in size. Nine months after another leaf follows, coming up the grooved surface of the mid-rib of that which preceded it; and so on at intervals of nine months each succeeding leaf approaching more nearly to the vertical; and increasing in size. In about fifteen years the plant presents the appearance of an enormous bell-shaped vase, the mouth upwards the stem not having yet appeared. From this time till about ten years later is the period of the greatest beauty of the plant, the leaves clustering together and supporting each other and being larger than they are after the stem appears. They are much of the shape of those of the fan palm, but larger, attaining a length of nearly twenty feet, including the stem, and about half of that breadth. A strong tendinous rib supports each leaflet; these are sewed round the inside of the Seychelles hats to strengthen them. The leaf consists of two layers of fibres crossing each other at right angles with great regularity, embedded in a rather thick stratum of parenchyma, which is enclosed in a tough skin. They are so strong that they are commonly used as baskets for carrying fruit and vegetables, without any preparation except tying the edges together.

At the age of about thirty years the plant begins to flower. The male and female blossoms are not found on the same plants, nor do they bear any resemblance to each other. The male flower is an enormous catkin sometimes more than three feet long and about as many inches in diameter, of a reddish brown colour and covered with rhomboidal valvate scales, disposed spirally round the stem.

From the angles of these spring the stamens. Within the circumference of this catkin at intervals corresponding to the apertures from which the stamens shoot, are found a series of little masses closely resembling in form the nautilus shell, and about three quarters of an inch in diameter, the mouth being directed to the aperture. These contain such a succession

of stamens in progressive stages of development, that the flowering is maintained for eight or ten years, each successive set of stamens thrusting off and replacing that which preceded it.

The female blossoms spring from a strong stem which forms a regular zigzag, the flowers being on the angles. The flowers offer nothing of the appearance of what is generally regarded as a blossom, being composed of three bracts three or four inches in diameter. A gummy secretion exudes from the apex, destined, no doubt, to arrest and secure the pollen which fecundates them. The stem is supported by three very strong bracts, of which the outer one, the top of which is wedge shaped, penetrates the stalk of the leaf immediately above it, in the under side of which nature has left a fissure accessible to it by this most admirable provision the stalk is enabled to support the enormous weight of fruit which sometimes hangs upon it, in some cases I doubt not, exceeding four hundred weight. I do not pretend to have ascertained this amount by actual experiment, but I have heard of eleven nuts on a single stalk, the probable weight of which might be forty pounds each at the time when they are heaviest: such clusters are however, rarely met with. Four or five may be taken as the average number on one stem.

From the fructification of the female blossom to the full maturity of the fruit, a period of seven or eight years elapses, and the flowers may remain for years in a virgin state without losing their fecundity. It not unfrequently happens that fructification is imperfect, in which case an irregular expansion of the ovary takes place, and a deformed and abortive fruit at the end of two or three years. If the fructification has been complete, the fruit attains its full size in three or four years, and is then full of a translucent jelly-like substance of a sweetish taste, high-relished by the Sechellois. This gradually dries up and is converted into a white horny kernel as hard at least as Suffolk cheese, about half an inch in thickness. The mesocarp is a leathery substance of a brown color, adhering closely to the shell. I have known but one instance of a person's eating the ripe kernel, and it proved fatal in a few hours but no post-mortem examination took place, so that the nature of the effect produced by it was not ascertained.

The nut in its perfect state is from eight to eighteen inches long, and nearly of the same breadth, much resembling in shape the conventional form of a heart. It is enclosed, like the ordinary cocoa nut, in a fibrous husk; but this envelope is far from being so thick or strong as that of the cocoa nut, and rots and drops off soon after the fall of the fruit.

Its surface is glossy and of a rich dark green. This husk is not convertible to any useful purpose.

If it be desired to plant these nuts, they should be simply laid flat on



the ground, and shaded from the sun. If buried, I have been assured they will not grow.

In order to get rid of the contents of the shell, the nuts are laid in a wet place, and the decomposed matter is extracted either when they are bored to serve as kegs, or sawed to serve as open vessels. Their capacity varies from three pints to five gallons, but both of these extreme dimensions are rare; about two gallons would be near the average. The shells of these nuts are used in Sechelles for domestic utensils of all sorts, and when sawed in half longitudinally they are the most convenient things possible for baling boats, for which purpose they are universally employed by the fishermen of this colony. Although the fruit is in general two lobed, it frequently happens that four lobes are envelopped in one husk, in which case they separate in pairs when the husk is stripped off, and the sides which were in contact are quite flattened. Three lobed nuts are sometimes met with, and I have seen one with five lobes.

The leaves of this palm form an excellent thatch, nearly as durable as shingles, and when cut previous to expansion form one of the best materials possible for making hats and bonnets, as well as little works baskets and mats, in the manufacture of which, as well as fans and artificial flowers, many of the Sechellois shew very great taste and skill.

The stem, which like those of all palms, consists of bare fibres imbedded in medullary substance, enclosed in hard sheath, is so hard that none but a very good axe will cut it; but it splits easily, and is used for fences, and also when hollowed as channels for conveying water: it is extremely durable.

It is much to be regretted that this unique and remarkable palm has been destroyed with the same improvident thoughtlessness as the forests in Mauritius, and on many square miles of land formerly covered with them there are not at present a single plant, and even one island, P'ile Ronde, has been completely stripped of them. It is a remarkable fact that, where the Cocos de Mer have been burnt off, the filao (*Casuarina equisetifolia*) immediately covers the soil, springing up almost as thickly as grass.

A few plants of the Coco de Mer exist in Mahe and Silhouette, where they have been planted, and but for their preservation in Curieuse, which belongs to the Government, the carelessness of the inhabitants and the very tardy growth of this palm might lead us to fear that it might become extinct, as I have reason to believe is the case with the finest fern in Mauritius, *Adiantum Alissimum*.

Most English travellers must have remarked the rarity of neat quick-set hedges in Mauritius, and may have fancied that plants suitable for

that kind of fence were scarce here. A hedge of the "Prunier de Madagascar" (*Flicourtia Ramontchi*) planted round this garden by Mr. Duncan, may convince them of the contrary. This tree, the thorns of which are far more formidable than those of the black thorn, forms a hedge which may be rendered impassable even to fowls. A very pretty ornamental hedge may also be made of the *Malpighia Cocifera*, here called "Houx de Perse" from the form of its leaves. The thorny bamboo also exhibits here a fence which may, with some attention, be rendered more secure than any wall or palisade.

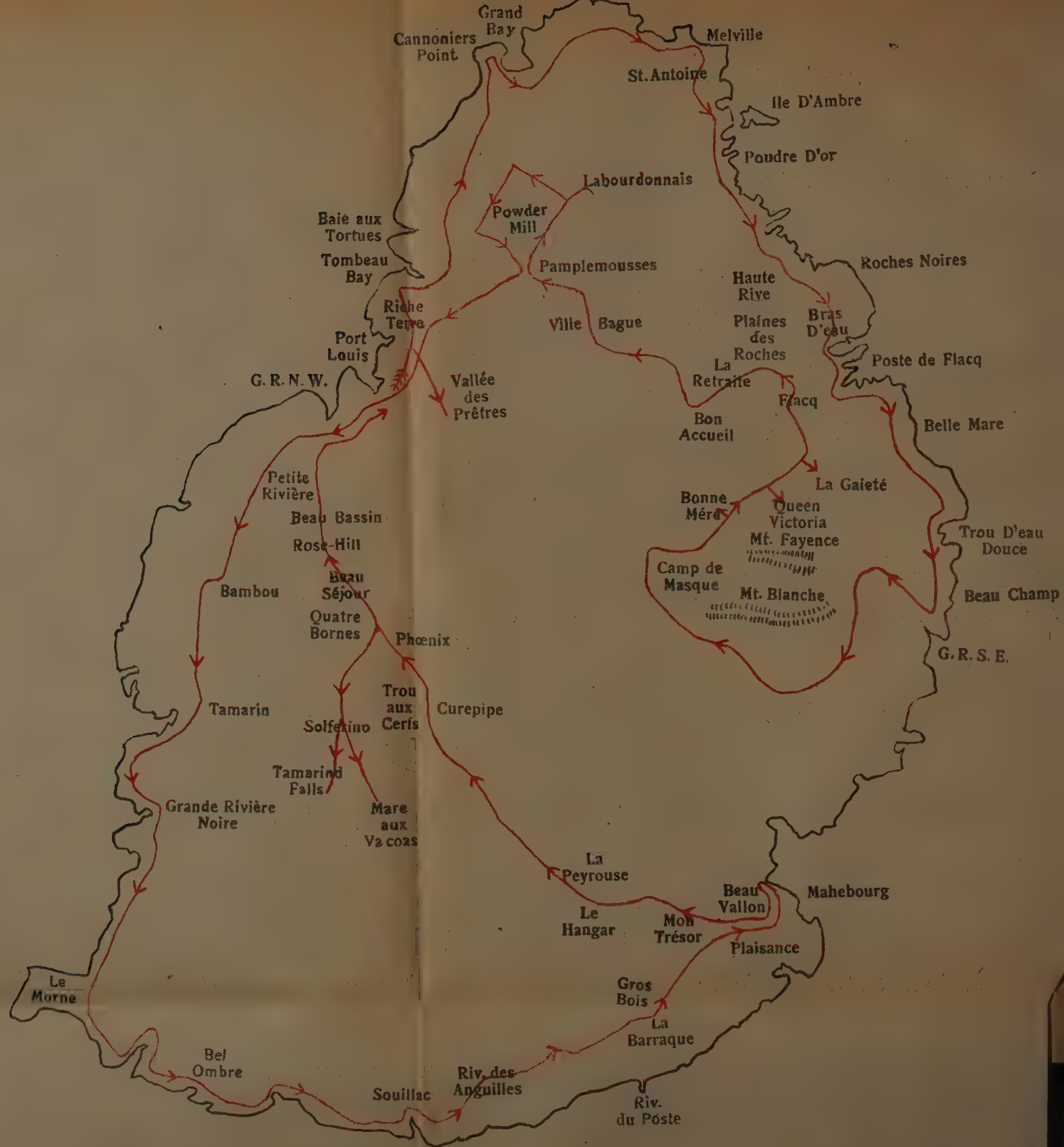
I must beg the reader's pardon for having detained him so long in a spot which possesses very great attractions to me, and proceed on the road towards Grand Bay, where, at about eleven miles from town, may be seen one of the finest estates and most admirable plants of a sugar manufactory in the colony: This is "Labourdonnais", the domain of C. Wiehe Esq: one of the first, in Mauritius, if not the first, in which sugar was produced by the vacuum pan. Every thing concurs to render a visit to this estate pleasant to the traveller. The plantations laid out with great judgment, and cultivated with the greatest skill, the well kept roads, shaded with trees, the comfortable lodgings and happy appearance of the labourers; the splendid stables with numerous mules in the finest condition; the well kept garden, producing the finest fruits and vegetables to be seen in the colony, the sugar house with every improved process in operation, and a mansion worthy of the whole combine to render Labourdonnais one of the most attractive estates in the colony.

An Elephant, the only one in the colony, is kept here. He was brought to this island when quite young, about twenty years ago, and has been for the last fifteen years located at Labourdonnais, where he leads a very easy life.

Between Labourdonnais and the coast, except in the wet season, the land presents a somewhat arid aspect. The plantations suffer terribly from the borer, and also from a weed introduced here about fifteen years ago called "l'herbe caillé", the greatest vegetable pest with which the canes are afflicted. It is a plant of the order Verbenaceæ, and the seeds being fugacious, are carried every where by the wind, so that there is no possibility of keeping the fields clear of it. It appears to impoverish the soil more than any other weed, or the excretions from its roots must be particularly injurious to the canes, which are always sickly where that abounds.

Until within a few years the estates in this part of the island were unrivalled for productiveness; but the use of guano has vastly increased the yield of the high clay lands, while the borer and l'herbe de caillé have much diminished the fertility of the stony soil near the sea, formerly considered as the only land on which fine sugar could be produced.





Map of Mauritius. Itinerary of GEORGE CLARK in his Rambles round the Island



In returning towards Port Louis, by taking a road to the right of that by which the traveller came from Pamplemousses, he will be led by a substantial stone building with a large enclosure formed by a strong wall. This establishment, now used as a district prison, is known by the name of "Powder Mills", and a manufactory of Gunpowder on a large scale was carried on there, and in 1774 an explosion took place which caused the death of many of the persons employed therein. The Powder Mills road, like that to Pamplemousses, is bordered by dwellings in nearly its whole length, many of which may be regarded as pretty little residences. They are mostly inhabited by persons carrying on business in Port Louis. On the little plain close to the Powder Mills is a simple tomb which marks the grave of Eyalapola, a Cingalese prince who was banished to this island, not for any mischief he had done, for he had always shewn himself attached and faithful to the British, but from an apprehension that his great popularity among his countrymen might some day tempt him to set up as their chief, in opposition to the English Government. He was allowed an ample pension here, and subject to no other restriction than the limits of the island, and appeared to resign himself with little or no regret to his expatriation. He was much liked by all who knew him, and was received in the best society of the island.

The Powder Mills road joins that from Pamplemousses at about three miles from Port Louis.

(To be continued)

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\* N. de la R., *Tridax procumbens* Linn. (Fam. Compositae.)

## STATISTIQUES

## 10. PLUVIOMÉTRIE &amp; TEMPÉRATURE

## Pluviométrie (Pouces)

LOCALITÉS Mois	NORD							CENTRE					
	Grand' Baie	Pample-mousses	Pample-mousses (Normale)	Aber-crombie	Aber-crombie (Normale)	Ruisseau Rose	Belle Vue Maurel	Beau Bois (Moka)	Helvétia	Réduit	Réduit (Normale)	Curepipe*	Curepipe (Normale)†
Nov. 1944 ...	0.46	0.53	2.13	0.17	2.78	0.14	0.51	0.98	0.71	0.36	2.33	2.29	5.71
Dec. ...	7.07	6.90	4.91	6.70	4.66	6.60	—	10.39	11.70	9.10	6.37	8.84	9.71

LOCALITÉS  MOIS	EST				OUEST					SUD			
	Centre de Flacq	Camp de Masque	Palmar	G.R.S.E.	Port-Louis	Case Noyale	Beun- Bassin	Beun- Bassin (Normale)	Richelieu	Rose Belle	Richen- eau	Camp Diable	Chemin Grenier
Nov. 1944 ...	0.87	1.37	0.27	1.43	0.11	0.00	0.02	2.31	0.00	2.13	2.14	1.01	1.02
Dec. „ ...	13.15	15.07	11.61	9.53	7.40	—	8.92	5.73	7.45	16.87	14.59	10.44	9.11

## Température °C

Localités Mois	Abercrombie		Beau-Bassin		Réduit			
	Max.	Min.	Max.	Min.	Max.	Min.	Moy.	Nor.
Nov. 1944 ...	31.8	21.5	29.7	19.1	27.2	19.2	23.0	21.8
Dec. „ ...	31.7	22.4	30.1	20.6	27.5	20.3	23.6	23.4

Collège Royal.

† Jardin Botanique.



## 20. PRODUCTION SUCRIÈRE DES USINES EN 1944

		Tonnes métriques			Tonnes métriques
PAMPLEMOUSSES			PLAINES WILHEMS		
Beau Plan	...	5,483	Highlands	...	6,899
Belle Vue (Harel)	...	4,918	Réunion	...	4,009
Solitude	...	7,353	Trianon	...	3,945
The Mount	...	8,683			
			RIVIÈRE NOIRE		
RIVIÈRE DU REMPART			Médine	...	8,474
Beau Séjour	...	3,740	SAVANNE		
Labourdonnais	...	8,044	Bel Ombre	...	3,477
Mon Loisir	...	8,360	Bénarès	...	5,125
St. Antoine	...	11,015	Britannia	...	6,219
			Saint Félix	...	3,868
FLACQ			Saint Aubin	...	3,023
Beau Champ	...	5,402	Savannah	...	5,256
Constance	...	8,721	Terracine	...	4,610
Deep River	...	4,998	Union	...	2,375
Queen Victoria	...	5,513	GRAND PORT		
Union	...	5,346	Beau Vallon	...	3,676
			Deux Bras	...	1,893
MOKA			Ferney	...	3,826
Alma	...	6,333	Mon Désert	...	
Mon Désert	...	8,183	et Mon Trésor	...	6,220
Sans Souci	...	9,452	Rose Belle	...	4,706
			Riche-en-Eau	...	4,440
			Savinia	...	6,059

